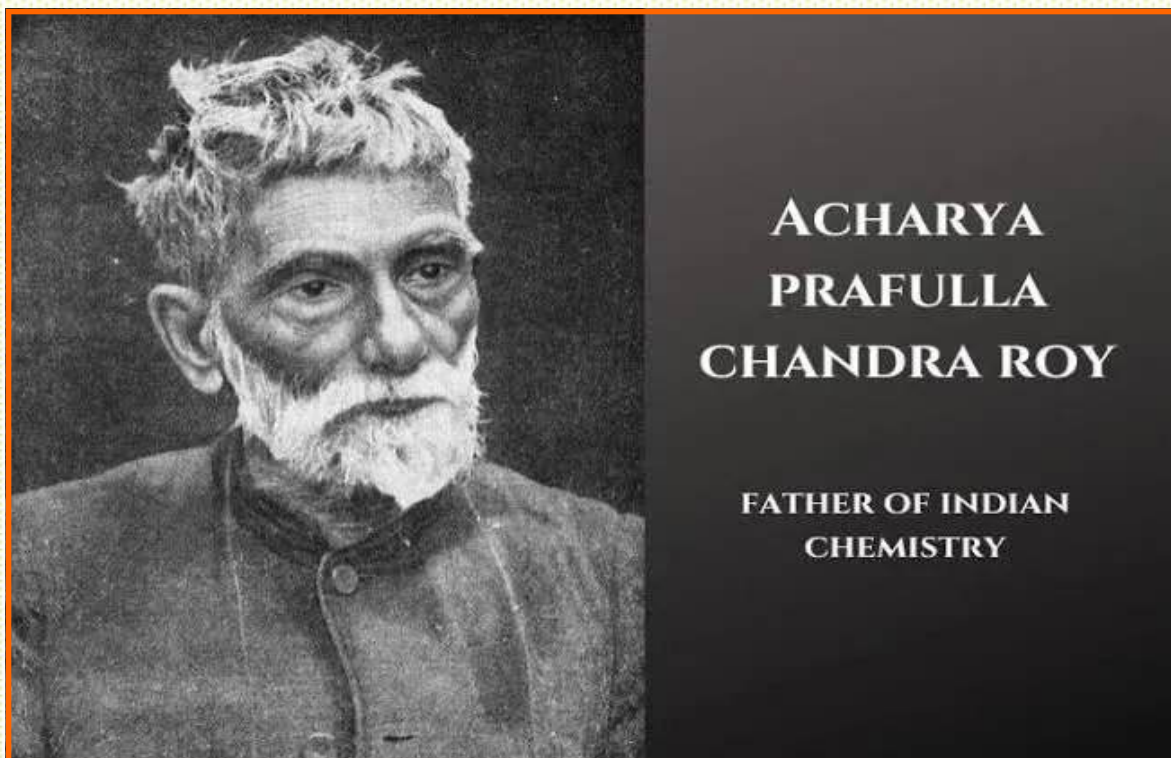


***Shantilal Shah Engineering College
Bhavnagar
Electrical Engineering Department
V I D Y U T A M***



***Volume- XVI
Issue Date: 15th August
2026***





Acharya Prafulla Chandra Ray (1861–1944)

- *Born in 02 November 1861; died on 16 June 1944.*
- *Earned a PhD from the University of Edinburgh.*
- *Chemistry Professor at Presidency College and University of Calcutta.*
- *Discovered the stable compound mercurous nitrite in 1896.*
- *Founded Bengal Chemical and Pharmaceutical Works in 1901.*

Acknowledgement

It is great pleasure to be part of the “Vidyutam” e-magazine, Volume-XVII. We would like share our gratitude to Dr. G. P. Vadodaria, Principal, SSEC and Prof. B. N. Vaidya, Head of department for their continuous support during preparation of “Vidyutam (Vol. XVII) e-magazine”. I am also thankful to Principal sir and H.O.D sir to give this beautiful opportunity to the students and faculties to wander in the world of journalism. We would like to expand our deepest gratitude to all the faculty members and staff members for their cooperation to accomplished the task .

“Vidyutam” started with an objective of Knowledge sharing and spreading the heterogeneous activities of Electrical Department at SSEC, Bhavnagar and it is gradually obtaining appreciation from the scholars, faculty members and readers from various institutes. With this, We are presenting the Seventeen volume of “Vidyutam ” e-magazine to our genuine readers.

Dr. Astik Dhandhia
Assistant Professor, EED.
Editor in Chief, Vidyutam

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Principal's Message



Dear Electrical Engineering Department,

I would like to extend my warm congratulations to the Head of Department, faculty members, and students for producing an outstanding Vidyutam. The coverage of various activities over the last seven month is truly impressive. I am particularly pleased to see the regular classroom teaching, co-curricular activities, industrial visits, and faculty training programs.

As you continue to nurture young minds, please ensure that you focus on the overall personality development of students, empowering them to face life's challenges with confidence. I encourage you to give your best efforts to bring about a positive transformation in your students.

Additionally, please ensure that faculty members stay updated with the latest technological advancements to effectively disseminate knowledge to the young engineers. Once again, I congratulate you on publishing an excellent edition of the Vidyutam.

Best regards,

Dr. G.P. Vadodaria

Principal, August 15, 2026.

Head of Department's Message



Dear readers,

It gives me immense pleasure to present before you the Seventeen edition of "Vidyutam" the e-magazine of our department. This edition is published at the time when our country is celebrating the 80th independence day. I wish all of you a very happy Independence day.

All of you have to do academic activities. It will enhance the teaching learning process. So I would insist all the students to fully utilize the available resources of institute to shape a better future for yourself.

This e-magazine of electrical engineering department was started in order to keep all the stakeholders updated with the activities and achievements of this department. Any suggestions for improvement are welcome from the stakeholders.

Finally I acknowledge the Vidyutam editing team for their efforts for the publication of this edition.

With best wishes,

Prof. B.N. Vaidya
Head of Department,
EED, SSEC, Bhavnagar.

"Evolution of Energy Meters From Electromechanical Induction Meters to Static and Smart Metering — Across Single-Phase, HT and EHT Installations"

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1. Introduction

The Energy metering — the accurate measurement and recording of electrical energy consumption — sits at the heart of every electricity supply business. It is the single instrument that converts a physical quantity (kilowatt-hours) into revenue, and its accuracy, reliability and functionality have shaped how utilities bill customers, manage networks and control losses. Over roughly a century, the energy meter has evolved through three distinct technology generations: the electromechanical induction meter, the solid-state static meter, and today's communication-enabled smart meter. This evolution has occurred in parallel across all classes of connection — single-phase domestic services, High Tension (HT) industrial and commercial supplies, and Extra High Tension (EHT) bulk transmission-level metering — though the pace and drivers of change differ at each voltage level.

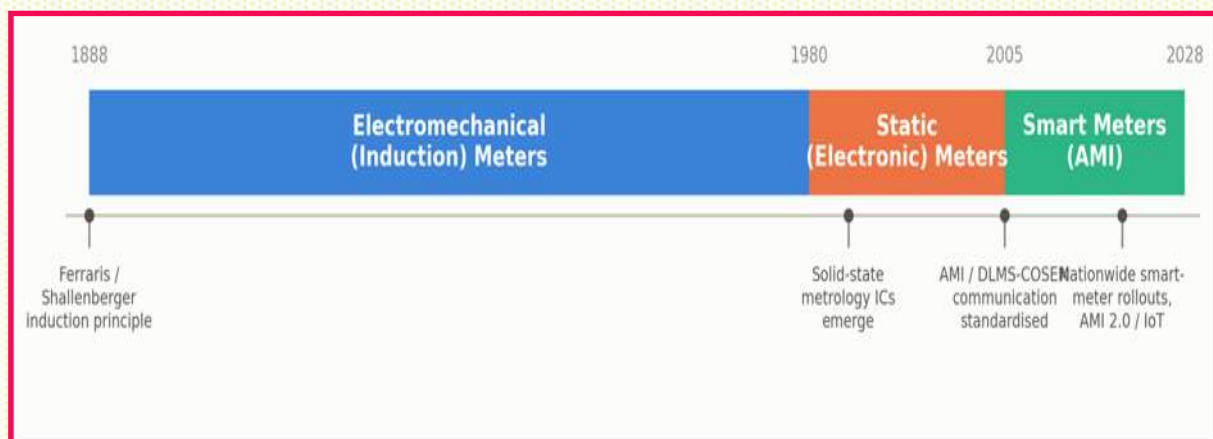


Fig.01 Evolution of energy metering technology, 1888 to present

2. The Electromechanical (Induction) Era

2.1 Working Principle

The induction-disc watt-hour meter, patented in essentially its modern form by Elihu Thomson and later refined by Oliver Shallenberger and Galileo Ferraris in the late 19th century, remained the dominant metering technology for over 100 years. It operates on the principle of electromagnetic induction: two coils — a current coil and a voltage coil — set up alternating magnetic fields that induce eddy currents in a thin aluminium disc. The interaction between these fields and the eddy currents produces a torque proportional to the power flowing through the meter, causing the disc to rotate at a speed proportional to instantaneous power. A permanent magnet provides a braking (retarding) torque proportional to disc speed, so that the steady-state rotational speed becomes proportional to power, and the total number of revolutions — counted through a gear train driving a mechanical register — becomes proportional to energy (kWh).

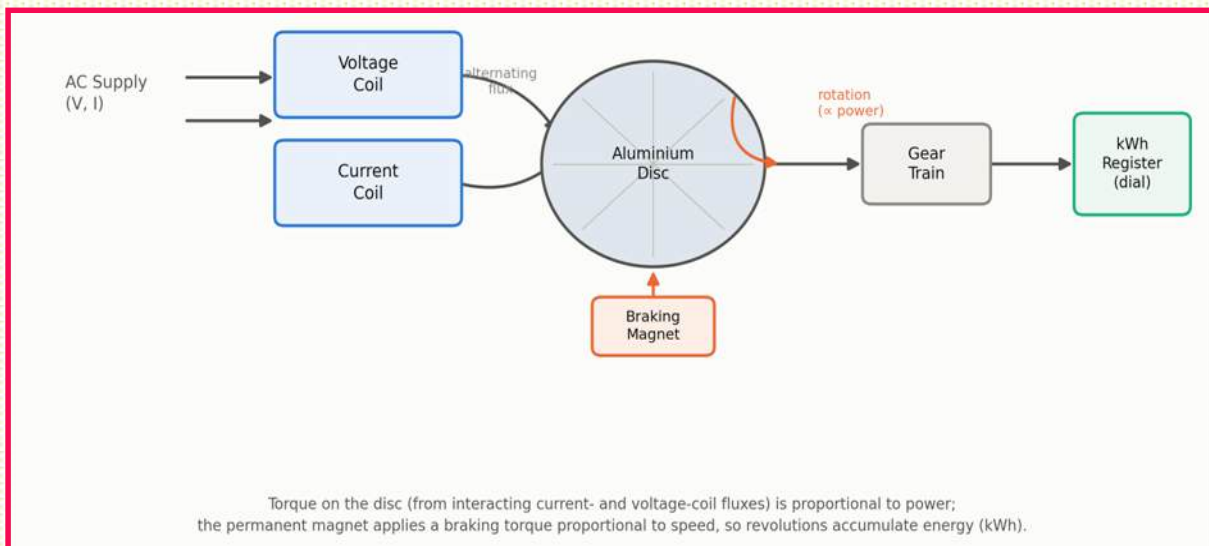


Fig.02 Construction principle of an electromechanical (induction) meter

2.2 Single-Phase Application

For domestic and small commercial consumers, single-phase induction meters became the ubiquitous standard worldwide, typically built to accu-

-racy Class 2.0 or Class 1.0 (per IS 722 / IEC 60521). They were rugged, required no external power supply, and could operate for decades with minimal maintenance — but they measured only cumulative active energy, had no memory of time-of-use, and could not detect or record tampering, reverse energy flow, or bidirectional power in any intelligent way.

2.3 HT and EHT Application

At HT (typically 11 kV to 33 kV) and EHT (66 kV and above, including 132 kV, 220 kV and 400 kV interconnection points) levels, induction meters could not be connected directly across such voltages or high currents. Instead, they were used in conjunction with Current Transformers (CTs) and Potential/Voltage Transformers (PTs/VTs), which step down the primary current and voltage to standard secondary values (typically 1 A or 5 A, and 110 V) that the meter's coils could safely handle. Three-element or two-element polyphase induction meters were used for three-phase HT/EHT metering, with meter readings multiplied by the CT and PT ratios (the "multiplying factor") to arrive at actual consumption. Accuracy was typically Class 0.5 or Class 1.0 for HT/EHT applications, and any error in the CT/PT ratio or burden directly affected billing accuracy.

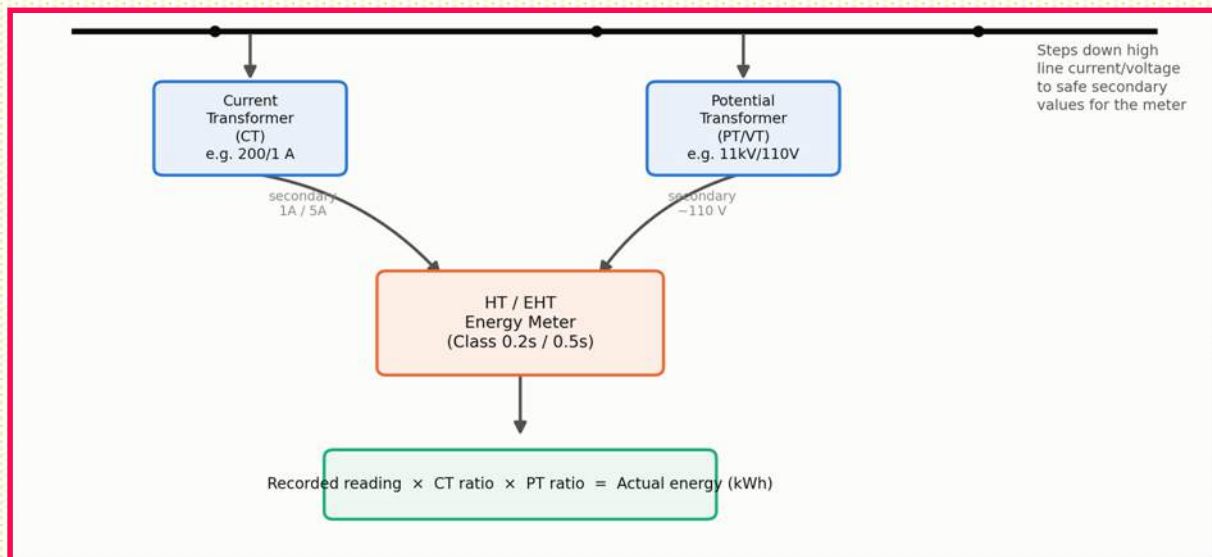


Fig.03 HT/EHT metering connection through Current and Potential Transformers.

2.4 Limitations that Drove Change

- Mechanical wear of bearings and gear trains caused accuracy drift over time and required periodic calibration/testing.

- No provision for Time-of-Day (TOD) or Time-of-Use (TOU) tariffs, which utilities increasingly needed to manage peak demand.
- Susceptible to physical and magnetic tampering (external magnets could slow or stop the disc), a major source of commercial losses.
- No remote reading capability — meter reading required manual site visits, which was labour-intensive and error-prone, especially for widely dispersed HT/EHT installations.
- Limited ability to record reactive energy (kVARh), maximum demand, power factor, or harmonic content — parameters increasingly important for HT/EHT commercial billing.

3. The Shift to Static (Electronic) Meters

3.1 Working Principle

Beginning in the 1980s–1990s and accelerating through the 2000s, electromechanical meters were progressively replaced by static (solid-state) meters. These meters sense voltage and current using shunts, current transformers, or Hall-effect/Rogowski-coil sensors, digitize the signals through an Analog-to-Digital Converter (ADC), and compute active power, reactive power, apparent power and energy using a microcontroller or dedicated metering IC running digital signal processing algorithms. Energy is accumulated digitally and displayed on an LCD/LED, with no moving parts at all.

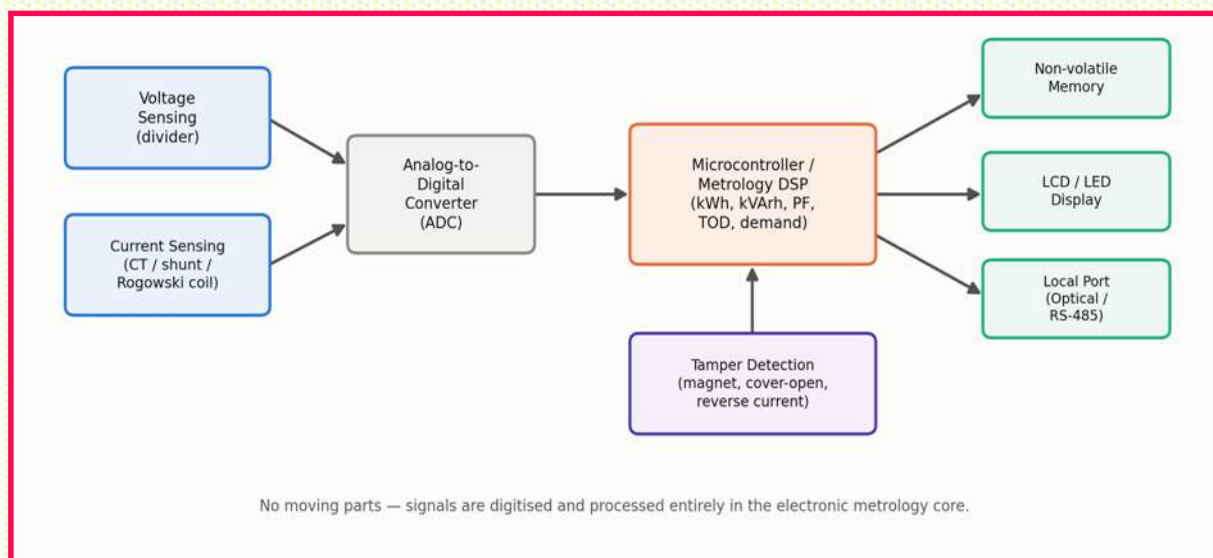


Fig.04 Static (electronic) meter — functional block diagram

3.2 Single-Phase Static Meters

For residential consumers, single-phase static meters (built to IS 13779 in India, or equivalent IEC 62053-21/62053-23 standards internationally) offered Class 1.0 or better accuracy, a much wider dynamic range (accurately measuring both very low and very high loads), tamper detection circuitry, and non-volatile memory to store billing history even through power outages. Many also introduced prepayment functionality, enabling utilities to offer pay-as-you-go electricity.

3.3 HT and EHT Static Meters

For HT and EHT metering points, static meters brought a step-change in capability. Built to tighter accuracy classes — typically Class 0.5s or Class 0.2s for HT consumers and Class 0.2s (sometimes 0.1s at critical interconnection and generation-metering points) for EHT — they could simultaneously record active energy, reactive energy, apparent energy, maximum demand, power factor, voltage/current per phase, and multi-tariff (TOD) energy registers in a single unit. Combined with high-accuracy CTs and PTs (often themselves Class 0.2 or better for EHT metering), static meters enabled far more precise commercial settlement between generators, transmission utilities and large industrial consumers. They also introduced a local communication port (optical port or RS-485/Modbus) allowing data to be downloaded on-site using a handheld meter reading instrument (MRI) or laptop-based software — a major improvement over manual register reading, though still requiring a site visit.

3.4 Advantages Driving Adoption

- No moving parts — negligible mechanical wear, longer service life, stable accuracy over time.
- Multi-parameter metrology: active/reactive/apparent energy, demand, power factor, harmonics, and TOD/TOU registers in one device.
- Wide dynamic range and better accuracy at low power factor and low load conditions.
- Built-in tamper detection: magnetic tamper, cover-open, neutral disturbance, and reverse energy flow logging.
- Non-volatile data logging that survives outages, supporting audit trails

for HT/EHT commercial disputes.

4. The Smart Metering Revolution (AMI)

4.1 What Makes a Meter "Smart"

A smart meter is, at its metrology core, a static meter — but it adds two-way digital communication, making it part of an Advanced Metering Infrastructure (AMI). Rather than requiring a person or handheld device on-site, smart meters transmit interval-level consumption data automatically to a utility's head-end system (HES) via wireless or wired networks, and can receive commands back, such as tariff updates, firmware upgrades, or remote connect/disconnect instructions.

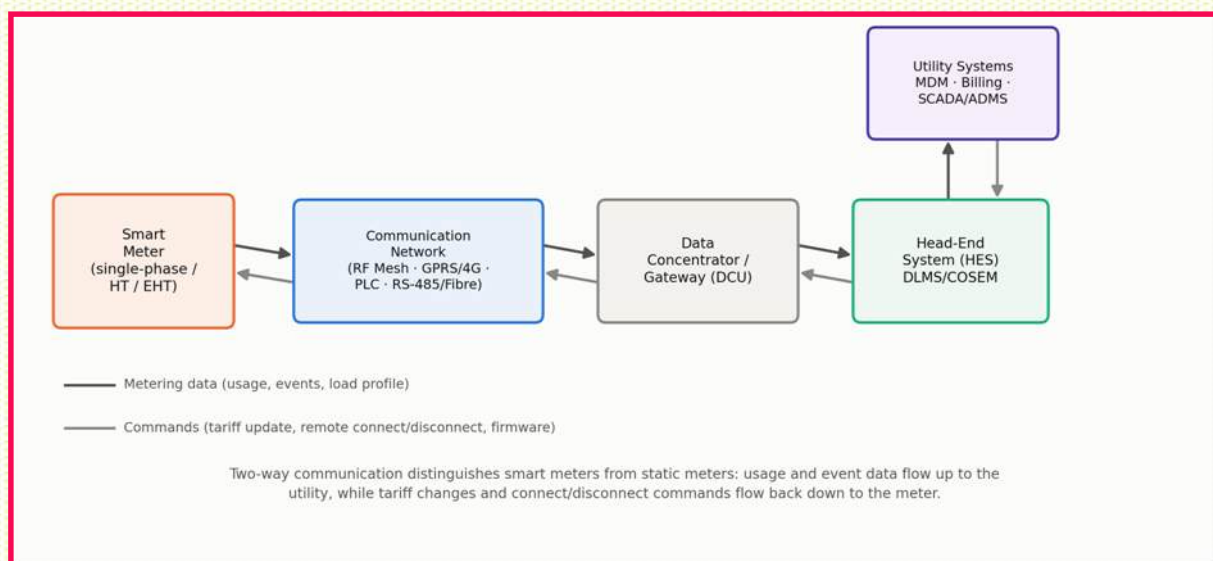


Fig.05 Smart meter (AMI) system architecture

4.2 Communication Technologies

A variety of communication media are used depending on geography, meter density and utility infrastructure, most commonly using the DLMS/COSEM (IEC 62056) application-layer protocol for interoperability:

- RF Mesh networks — meters relay data hop-by-hop to a nearby data concentrator, well suited to dense urban low-voltage networks.
- Cellular (GPRS/3G/4G/NB-IoT) — direct SIM-based communication to the head-end, common for HT/EHT and rural single-phase meters where mesh density is impractical.
- Power Line Communication (PLC) — data riding on the existing LV dis-

-tribution cable, avoiding the need for separate wireless infrastructure.

- RS-485/Modbus with fibre or leased-line backhaul — typically used for critical HT/EHT substation and interconnection metering where guaranteed, low-latency data delivery is required for SCADA integration.

4.3 Single-Phase Smart Meters

For residential consumers, single-phase smart meters (e.g., built to IS 15959 in India) enable automated monthly or even 15-minute-interval billing, real-time consumer-facing consumption display via mobile apps, prepayment with remote recharge, remote service connect/disconnect (eliminating field visits for non-payment or new connections), net metering support for rooftop solar customers, and instant outage/restoration notification to the utility.

4.4 HT and EHT Smart Metering

At HT and EHT levels, "smart" metering builds on the already-sophisticated static meter core by adding continuous, high-frequency remote telemetry integrated directly with the utility's SCADA/Energy Management System and settlement systems. Key characteristics include Class 0.2s (HT) to Class 0.2s/0.1s (EHT) accuracy with dual/check metering for redundancy at critical revenue and interconnection points, real-time or near-real-time (typically 15-minute block) data availability for Availability-Based Tariff (ABT) and open-access energy accounting, integration with substation automation and protection systems, remote configuration and firmware management, and cyber-secure, encrypted, redundant-path communication given the criticality of bulk-supply revenue points. HT/EHT smart meters are central to grid balancing, renewable energy integration, and inter-utility energy accounting in modern power markets.

4.5 Benefits of Smart Metering

Because a smart meter combines high-accuracy static metrology with two-way communication, its benefits accrue on both sides of the meter: to the consumer, who gains transparency and control over usage, and to the utility, which gains visibility, revenue assurance and operational efficiency across single-phase, HT and EHT connections alike.

Benefits to the Consumer	Benefits to the Utility
✓ Accurate, transparent billing No estimated bills; readings reflect actual consumption. ✓ Real-time usage visibility Mobile app / web portal shows live and historical consumption. ✓ Lower bills via TOU tariffs Shift usage to off-peak hours to reduce cost where ToU tariffs apply. ✓ Fast service activation New connections, load changes and recharges processed remotely. ✓ Convenient prepayment Online recharge; no need to queue or visit a collection center. ✓ Quicker fault resolution Outage and restoration are confirmed automatically to the utility. ✓ Solar & EV ready Net-metering and EV tariff support for prosumers.	✓ Lower operating cost No manual meter-reading rounds; fewer billing errors and disputes. ✓ AT&C loss reduction Tamper/theft alerts and feeder-DT-consumer energy accounting. ✓ Better revenue assurance Remote connect/disconnect enables faster action on non-payment. ✓ Granular grid visibility Interval load data supports demand forecasting and DSM programs. ✓ Faster outage management Last-gasp alerts and restoration confirmation cut response time. ✓ Grid modernisation Integrates with SCADA/ADMS for automation and asset planning. ✓ Renewable integration Supports rooftop solar, EV charging load, and open-access accounting.

Fig.06 Smart metering benefits — Consumer vs. Utility.

4.6 Benefits to the Consumer

- Accurate, transparent billing — bills reflect actual recorded consumption, eliminating estimated-billing disputes.
- Real-time and historical usage visibility through a mobile app or web portal, helping consumers understand and manage their own consumption.
- Potential bill savings under Time-of-Use (TOU) tariffs by shifting flexible loads to off-peak hours.
- Faster, remote service delivery — new connections, load enhancement, and tariff changes processed without a field visit.
- Convenient prepayment with online recharge, avoiding queues at collection centres and giving better control over spend.
- Quicker fault and outage resolution, since restoration is confirmed automatically rather than through a complaint call.
- Ready support for rooftop solar net metering and EV charging tariffs as

consumers become prosumers.

4.7 Benefits to the Utility

- Lower operating cost — eliminates manual meter-reading rounds and reduces billing errors, complaints, and disputes.
- AT&C loss reduction through real-time tamper/theft alerts and energy accounting across feeder, distribution transformer and consumer levels.
- Improved revenue assurance via remote connect/disconnect, enabling faster action on non-payment and reduced truck rolls.
- Granular, interval-level load visibility that supports demand forecasting, peak-load management and demand-side management (DSM) programs.
- Faster outage detection and restoration verification through last-gasp alerts and automatic restoration signals.
- Deeper integration with SCADA/ADMS for grid automation, protection coordination and asset planning — particularly valuable for HT/EHT metering points.
- Better support for renewable integration and open-access energy accounting as rooftop solar and EV charging load grow.

5. Comparative Summary

The table below summarises how each meter generation differs across the key parameters that matter for single-phase, HT and EHT applications.

Parameter	Electromechanical (Induction)	Static (Electronic)	Smart Meter (AMI)
Measuring element	Rotating aluminium disc; eddy current + electromagnetic torque	Voltage/current sensors + ADC + micro-controller/DSP	Static metrology core + communication module + memory
Accuracy class (typical)	Class 1.0 / 2.0 (LT); Class 0.5 / 1.0 (HT with CT-PT)	Class 1.0 (LT); Class 0.2s / 0.5s (HT); Class 0.2s (EHT)	Same as static core: 0.2s–0.5s, with drift self-monitoring

Parameter	Electromechanical (Induction)	Static (Electronic)	Smart Meter (AMI)
Tamper & theft detection	Minimal; vulnerable to magnetic and mechanical tampering	Magnetic, cover-open and reverse-current detection with event	Real-time tamper alerts pushed to utility head-end system
Remote connect/disconnect	Not possible	Not possible (needs field visit)	Built-in relay for remote service switching
Typical application	Legacy domestic/commercial LT connections	Modern LT consumer, HT industrial, EHT bulk-supply metering	Domestic AMI roll-outs, HT/EHT smart grid & substation me-

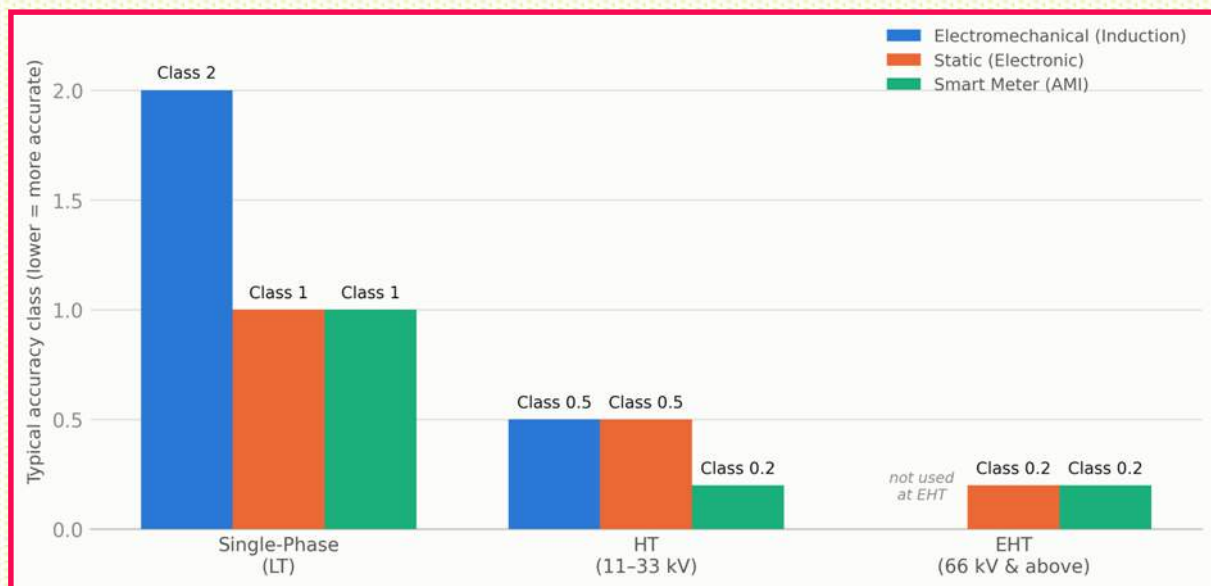


Fig.07 Typical metering accuracy class by generation and voltage level (lower class number = higher accuracy).

6. HT Static Meter Display — Reading Sequence and Interpretation

6.1 Normal (Auto-Scroll) Display Reading Sequence

What most consumers, meter readers and site engineers actually interact with on an HT static meter is its front LCD panel. On a typical HT trivector meter the display either auto-scrolls through a fixed sequence of readings every 8–10 seconds, or steps forward one reading at a time on each press of a push-button — with the full sequence repeating in a loop.

The exact order and legends are programmable to each DISCOM's requirement, but the sequence below is representative of the default "normal mode" scroll used across L&T, Secure Meters, HPL, Genus, Schneider Electric and similar IS 14697/CBIP 325-compliant HT meters, and covers the readings needed to understand a consumer's energy utilisation at a glance.

Sr. No.	Display Parameter	Typical Reading Shown	What It Tells the Consumer / Utility
1	Cumulative Active Energy (Import)	e.g. 0001234.56 kWh	The primary billing register — total active energy drawn since commissioning or last reset, already scaled by the CT $\times$ PT multiplying factor. This is the headline number on the consumer's bill.
2	Cumulative Apparent Energy	e.g. 0001450.32 kVAh	Many HT/industrial tariffs bill on kVAh rather than kWh, so a poor power factor inflates this register relative to kWh and directly increases the bill.
3	Cumulative Reactive Energy (Lag)	e.g. 0000512.10 kVARh (Lag)	Reactive energy drawn by inductive loads (motors, transformers). This is the basis for power-factor penalty calculations under most HT tariffs.
4	Cumulative Reactive Energy (Lead)	e.g. 0000008.40 kVARh (Lead)	Reactive energy fed back into the grid, typically from over-compensated capacitor banks. Some tariffs penalise a leading power factor just as they do a lagging one.
5	Maximum Demand — kVA, with date & time	e.g. 245.60 kVA on 14-Jul 18:45	The highest demand block (usually a 15- or 30-minute average) recorded in the current billing cycle — this sets the demand charge, often the largest line item on an HT bill.
6	Previous month's MD (kVA), with date & time	e.g. 238.10 kVA on 09-Jun 19:15	Lets the consumer or auditor compare demand trends month-to-month and verify the current MD reading during a billing dispute.
7	Average Power Factor (billing cycle)	e.g. 0.94 Lag	The energy-weighted average PF for the cycle — used to compute the PF-linked rebate (near-unity PF) or surcharge (poor PF) on the bill.

Sr. No.	Display Parameter	Typical Reading Shown	What It Tells the Consumer / Utility
8	Instantaneous phase voltages	e.g. VR 6350 V, VY 6342 V, VB 6355 V	Snapshot of PT-secondary voltage per phase at the moment of reading; a large imbalance can indicate a PT fault, loose connection, or unbalanced HT supply.
9	Instantaneous phase currents	e.g. IR 4.82 A, IY 4.79 A, IB 4.85 A	Snapshot of CT-secondary current per phase; imbalance beyond a few percent usually points to an unbalanced consumer load or a wiring/CT issue worth investigating.
10	Instantaneous kW / kVA / kVAr	e.g. 210.4 kW / 224.0 kVA / 76.2 kVAr	The real-time three-phase demand at the instant of reading — useful for a site engineer checking current plant loading against the billed MD.
11	Instantaneous power factor	e.g. 0.938 Lag	The PF the plant is drawing right now, as opposed to the billing-cycle average — useful for real-time capacitor bank tuning.
12	Line frequency	e.g. 50.02 Hz	Confirms the grid frequency at the metering point; large or sustained deviation can itself signal a grid disturbance.
13	TOD/ToU zone-wise energy (kWh & kVAh per zone)	e.g. Zone-A 320 kWh, Zone-B 810 kWh ...	Energy consumed within each Time-of-Day tariff slot (peak/normal/off-peak) — the basis for ToU billing and for the consumer's own load-shifting decisions.
14	TOD/ToU zone-wise Maximum Demand	e.g. Zone-A MD 180 kVA ...	The peak demand recorded within each TOD zone — relevant where a utility levies a separate peak-hour demand charge.
15	Billing date / last MD-reset date	e.g. 01-Aug-2026	The date the current billing register set was last reset — confirms which cycle the displayed cumulative and MD figures belong to.
16	Count of power interruptions (since reset)	e.g. 03	Number of supply interruptions recorded in the billing cycle — useful input for reliability (SAIFI/SAIDI-type) tracking at the consumer end.
17	Real-time clock — date & time	e.g. 12-AUG-2026 11:47:03	The meter's own clock, used to timestamp every TOD block, MD occurrence and tamper event; large drift here undermines all time-based billing.

Sr. No.	Display Parameter	Typical Reading Shown	What It Tells the Consumer / Utility
18	Meter serial number / consumer ID	e.g. SN: L&T-HT-0234567	Uniquely ties the physical meter to its type-test certificate, CT/PT ratio programming, and the consumer's account

6.2 Alternate / On-Demand Display Mode

Most HT meters also carry a secondary "alternate" or "on-demand" display mode, entered by a longer button press, that exposes a deeper set of diagnostic and audit parameters beyond the normal billing scroll. Typical additions include:

- Phase-wise instantaneous kW, kVA, kVAr and power factor for R, Y and B phases individually, rather than only the three-phase total.
- Neutral current and voltage/current Total Harmonic Distortion (THD %) per phase, useful for power-quality investigations.
- Programmed CT ratio, PT ratio and the resulting multiplying factor, along with the meter constant (impulses per kWh) used for calibration.
- Previous 6–12 months' billing snapshot — cumulative kWh/kVAh, MD and average PF for each prior cycle — for trend review without pulling load-survey data.
- Tamper/event summary and the most recent event records, each with an occurrence and restoration time-stamp.
- On AMI-enabled meters: last successful communication time-stamp with the head-end system, signal strength, and RTC/battery health status.

Taken together, the normal-mode scroll answers "what will I be billed and why," while the on-demand mode answers "is the meter itself healthy, correctly configured, and trustworthy" — the second question matters just as much as the first when a reading is disputed.

7. Challenges and Future Outlook

The transition to smart metering, while well underway across single-phase, HT and EHT segments, is not without challenges:

Cyber security of communication networks and head-end systems, interoperability between multi-vendor meters and data concentrators, the capital cost of large-scale AMI rollouts, and the need for robust data-privacy governance as granular consumption data becomes available. Looking forward, the metering ecosystem is moving toward tighter integration with distribution automation and Advanced Distribution Management Systems (ADMS), edge analytics within the meter itself (event-based anomaly detection rather than raw data transmission), support for bidirectional prosumer metering as rooftop solar and electric vehicles proliferate, and blockchain- or platform-based peer-to-peer energy trading at the low-voltage level. At HT and EHT levels, the emphasis continues to shift toward higher-accuracy, cyber-secure, redundant metering that can support real-time grid balancing and market settlement in increasingly renewable-heavy power systems.

8. Conclusion

The journey from the spinning aluminium disc of the electromechanical induction meter to today's communication-enabled smart meter reflects the broader digitisation of the power sector. What began as a purely mechanical device for recording cumulative energy has become a multi-function, network-connected instrument central to billing accuracy, loss reduction, grid visibility and the ongoing transition to a more distributed, renewable and consumer-interactive electricity system. Whether at the single-phase domestic connection, the HT industrial feeder, or the EHT transmission interconnection, this evolution has consistently been driven by the same underlying goals: greater accuracy, richer data, lower losses, and less dependence on manual intervention.

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A Seminar organized by Electrical Department on Electric Fire Safety Awareness Program and Mock

The Department of Electrical Engineering, Shantilal Shah Government Engineering College, Bhavnagar, organized an Electric Fire Safety Awareness Program and Mock Drill on 04 February 2026 at 11:00 AM in Room No. E115. The programme was attended by approximately 90 students of the 4th and 6th semesters along with 10 faculty members.

The programme focused on electrical and fire safety hazards, preventive measures, fire classification, and the appropriate use of fire extinguishers. Participants were introduced to the fire triangle and different classes of fire, along with the applications of ABC/DCP and CO₂ fire extinguishers. Special emphasis was placed on electrical safety practices such as proper earthing, ISI-marked equipment, ELCB and MCB installation, and safe handling of electrical appliances.

A practical fire-safety mock drill was conducted to demonstrate the safe and effective use of fire extinguishers. The *PASS technique—Pull, Aim, Squeeze and Sweep—*was explained and demonstrated. Students and faculty actively participated in the drill and gained practical experience in emergency response and fire-extinguisher handling, strengthening the institute's commitment to safety awareness and preparedness.

Some glimpses of the event:





An expert talk organized by Electroverse club of Electrical Department on Salt uses in daily life and

On the occasion of National Science Day 2026, the Electrical Engineering Students' Club Electroverse of Shantilal Shah Engineering College organized the expert talk on "Salt uses in daily life and in industries" under the theme "Bridging Academia and Industry through Salt Science." on 26th February 2026. The seminar featured Dr. Bipin Vyas, Principal Scientist at CSIR–Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar, as the keynote speaker.

During the session, Dr. Vyas highlighted the significance of India's salt industry, modern salt production techniques, advanced bittern management, and the recovery of value-added chemicals. He also discussed the role of scientific research and technological innovations in promoting sustainable industrial development and strengthening the vision of Atmanirbhar Bharat. Students gained valuable insights into the industrial applications of salt, emerging career opportunities and the importance of research and innovation in the chemical and allied industries.

Some glimpses of the event:





An Industrial Visit to Hi-Tech Meter Testing Laboratory, PGVCL, Bhavnagar organized by Electrical Department

The Department of Electrical Engineering, Shantilal Shah Engineering College, Bhavnagar, organized an industrial visit to the Hi-Tech Meter Testing Laboratory, PGVCL, Bhavnagar on 21st February 2026 for 32 students of Semester VI under the guidance of Prof. (Dr.) J. B. Sarvaiya and Prof. (Dr.) M. V. Gojiya. The visit was conducted as a part of the Electrical Measurement and Measuring Instruments course.

During the visit, students gained practical exposure to the testing and calibration of conventional and smart energy meters, CT/PT testing procedures, and various Indian Standards related to electrical measurements. Experts from the laboratory demonstrated modern testing equipment and explained the importance of accuracy, calibration, and quality assurance in power distribution systems.

The visit successfully bridged the gap between classroom learning and industrial practices, providing students with valuable insights into advanced metering technologies and NABL-accredited testing procedures. The Department expresses its sincere gratitude to the officials and staff of PGVCL for their valuable guidance and support in making the visit informative and enriching.

Glimpse of the visit:



An Industrial Visit to Sumitomo Chemical India Limited, Bhavnagar organized by Electrical Department

The Department of Electrical Engineering, Shantilal Shah Engineering College, Bhavnagar, organized an industrial visit to Sumitomo Chemical India Limited, Bhavnagar on 28th March 2026 for 44 students of Semester IV. The visit was accompanied by Prof. (Dr.) J. B. Sarvaiya and Prof. (Dr.) T. B. Maniar.

Sumitomo Chemical India Limited is a leading agrochemical and specialty chemical manufacturing company, engaged in producing crop protection chemicals, household insecticides, and other chemical products using advanced manufacturing processes while maintaining high standards of safety, quality, and environmental sustainability.

During the visit, students were introduced to the company's manufacturing processes, electrical power distribution system, process automation, industrial safety practices, and maintenance of electrical equipment. They also interacted with industry experts, who explained the practical applications of electrical engineering in modern chemical industries. The visit provided valuable industrial exposure, helping students connect theoretical concepts with real-world engineering practices and enhancing their understanding of industrial operations, safety standards, and career opportunities in the chemical manufacturing sector.



An Industrial Visit to 220 kV Vartej Substation (GETCO), Bhavnagar organized by Electrical Department

The Department of Electrical Engineering, Shantilal Shah Engineering College, Bhavnagar, organized an industrial visit to the 220 kV Vartej Substation (GETCO), Bhavnagar on 29th April 2026. A total of 54 Electrical Engineering students, accompanied by Prof. (Dr.) A. B. Parmar and Prof. (Dr.) J. B. Sarvaiya, participated in the visit.

GETCO (Gujarat Energy Transmission Corporation Limited) is responsible for transmitting electrical power across Gujarat through an extensive network of high-voltage substations and transmission lines, ensuring a reliable and efficient power supply throughout the state.

During the visit, students gained practical knowledge of the power transmission system, including the operation of 220 kV, 66 kV, and 11 kV substations, power transformers, switchgear, protection systems, control room operations, and safety practices. The engineers also demonstrated maintenance and testing procedures for various substation equipments.

The visit provided valuable hands-on exposure to modern power transmission infrastructure, bridging the gap between classroom learning and industrial practices while enhancing students' understanding of electrical power systems and substation operations.

Glimpse of the visit:



Abhyudaya Tech Fest-2026

Internship Poster Presentation competition for Final Year students

The Department of Electrical Engineering, Shantilal Shah Engineering The Department of Electrical Engineering organized the semester VIII Internship Poster Presentation to showcase students' internship experiences and technical learning under Abhyudaya Tech Fest-2026 on 4th May 2026. Total number students participated were 35. Students presented their industrial projects, innovative solutions, and practical knowledge gained during their internships before a panel of faculty members. The event encouraged technical communication, innovation, and industry-oriented learning. The following students secured top positions in the competition:

- First Prize: Yashkumar Jitubhai Padhiyar, Chirag Ashwinbhai Bhutaiya, Kavan Dhandhukiya, and Mehta Deepbhai Chandrakantbhai (Internship at IRIS Automation Pvt. Ltd.)
- Second Prize: Kishan Harshadray Parmar, Harshal Kiritbhai Raval, and Pavanji Manharsinh Solanki (Internship at IRIS Automation Pvt. Ltd.).
- Third Prize: Brijraj Dineshbhai Kankotiya (Internship at L&T MHI Power Boilers Pvt. Ltd.)

Some glimpses of the event:





A Session on “How to Prepare Aptitude and Reasoning

The Department of Electrical Engineering, Shantilal Shah Engineering College, Bhavnagar, organized a student development session on “How to Prepare Aptitude and Reasoning while Appearing for Placement” on 10th April 2026, under the guidance of Prof. D. J. Varia, Training & Placement Officer.

The session was conducted by Prof. Maqbul U. Ghanchi with the objective of enhancing students’ placement readiness and employability skills. More than 65 students actively participated in the session.

The session focused on the importance of aptitude and reasoning in placement assessments and covered effective preparation strategies, important areas of practice, time management, problem-solving techniques, and improving speed and accuracy. Students were also guided on developing a systematic approach to preparing for aptitude and reasoning tests conducted as part of recruitment processes.

The session provided practical guidance to students and encouraged them to adopt regular practice and structured preparation to perform confidently in placement examinations.

Some glimpses of the event:





7th Semester GTU Results

The top students ranking of 7th Semester students according to SPI is as follows

Sr. No.	Enrollment No.	Name of student	SPI
1	220430109006	VAGHELA CHETANBHAI DALSUKHBHAI	8.50
2	230433109043	THAKER KASHYAP VIMAL	8.30
3	230433109047	VYAS AUROSURYA JAYESHBHAI	8.00

The top three students ranking of 7th semester students according to CPI is as follows

Sr. No.	Enrollment No.	Name of Students	CPI
1	230433109043	THAKER KASHYAP VIMAL	8.00
2	230433109047	VYAS AUROSURYA JAYESHBHAI	7.90
3	230433109019	KAVAN DHANDHUKIYA	7.70

5th Semester GTU Results

The top three students ranking of 5th Semester students according to SPI is as follows

Sr. No.	Enrollment No.	Name of Students	SPI
1	210430109015	DHANDHALA NIKITABEN VINODBHAI	7.91
2	240433109038	RATHOD SHIVANG HARESHBHAI	7.83
3	240433109019	KAPDI NANDAN MANSUKHBHAI	7.78

The top three students ranking of 5th semester students according to CPI is as follows

Sr. No.	Enrollment No.	Name of Students	CPI
1	230430109008	JETHAVA SANJAYBHAI DINESHBHAI	7.39
2	240433109038	RATHOD SHIVANG HARESHBHAI	7.28
3	240433109053	ZAPADIYA ARPAN MAHESHBHAI	7.19

3rd Semester GTU Results

The top students ranking of 3rd Semester students according to SPI is as follows

Sr. No.	Enrollment No.	Name of student	SPI
01	250433109033	SOLANKI VISHALBHAI NATHUBHAI	7.7
02	250433109028	SAKARIYA HARSH RAKESHBHAI	7.5
03	240430109034	YADAV PARVESH RAJESH	7.4
04	250433109013	KAMARIYA PAVANKUMAR VINODBHAI	7.4

The top three students ranking of 3rd semester students according to CPI is as follows

Sr. No.	Enrollment No.	Name of Students	CPI
1	250433109033	SOLANKI VISHALBHAI NATHUBHAI	7.7
2	250433109028	SAKARIYA HARSH RAKESHBHAI	7.5
3	250433109013	KAMARIYA PAVANKUMAR VINODBHAI	7.4

1st Semester GTU Results

The top three students ranking of 1st Semester students according to SPI/CPI is as follows

Sr. No.	Enrollment No.	Name of Students	SPI
1	240430109024	WAGHELA JENIL PRAKASH	8.41
2	240430109004	PARMAR DAX BHARATBHAI	8.18
3	240430109030	BARAD VISHVKUMAR VIPULBHAI	8.12

Faculties Trainings

- Prof. B. N. Vaidya, associate professor in the electrical department successfully completed the one-week STTP on “Swajan Mitra: A Psychological Wellness Program for Faculties”, jointly organized by Commissionerate of Technical Education, Gandhinagar and Vishwakarma Government Engineering College, Ahmedabad, from 9 to 13 February 2026.
- Prof. (Dr.) A. B. Parmar, associate professor in the electrical department successfully completed the one-week STTP on “Artificial Intelligence Application in Power & Energy”, organized by L. D. Engineering College, Ahmedabad, from 9 to 13 March 2026. The programme provided exposure to the application of AI techniques in modern power and energy systems.
- Prof. (Dr.) M. D. Solanki, assistant professor in electrical department completed a 12-week MOOC on “AI in Human Resource Management” offered by IIT Guwahati, broadening his expertise into the application of Artificial Intelligence in human resource practices.
- Prof. (Dr.) J. B. Sarvaiya, assistant professor in electrical department completed the 12-week MOOC on “Smart Grid: Basics to Advanced Technologies” offered by IIT Roorkee.
- Prof. V. B. Pandya, assistant professor in electrical department completed the 12-week MOOC on “Smart Grid: Basics to Advanced Technologies” offered by IIT Roorkee. Notably, Prof. V. B. Pandya secured a Top 1% rank with an impressive score of 93%, reflecting his outstanding performance in the course.
- Prof. (Dr.) T. B. Maniar, assistant professor in electrical department completed the 12-week MOOC on “Smart Grid: Basics to Advanced Technologies” offered by IIT Roorkee.

Faculties Trainings

- Prof. Shilpa Patel, assistant professor in the electrical department successfully completed a two-week Faculty Industrial Training at Topline Switchgear Pvt. Ltd., Gandhinagar, from 15 to 25 June 2026. The training provided valuable practical exposure to industrial practices and switchgear technologies.
- Prof. (Dr.) M. V. Gojiya, Assistant Professor in the Electrical Department successfully completed the one-week STTP on “Artificial Intelligence Application in Power & Energy”, organized by L. D. Engineering College, Ahmedabad, from 9 to 13 March 2026. The programme provided exposure to the application of AI techniques in modern power and energy systems.

Faculties Publications

The Electrical Engineering Department continued to strengthen its research culture during January–August 2026, with faculty members publishing research papers in reputed journals covering contemporary areas of electrical engineering. The publications focused particularly on power quality enhancement, harmonic filters, optimization algorithms, nonlinear distributed generation, electric spring control, and AI-based static security assessment.

- Prof. (Dr.) A. B. Parmar, Associate Professor, contributed two journal publications: “Power Quality Improvement through Harmonic Filters Using Tasmanian Devil Optimization Algorithm” in ITEGAM-JETIA (March 2026; ISSN: 2447-0228) and “Power Quality Enhancement Through Harmonic Filters Using Novel Bat Algorithm in RDS with Nonlinear Distributed Generation” in the International Journal of Electrical and Electronics Research (IJEER) (June 2026; ISSN: 2347-470X).

- Prof. (Dr.) M. D. Solanki, Assistant Professor, contributed three journal papers, including “Robust Lyapunov-integral control of 13-level cascaded electric spring using linear matrix inequality optimisation” in the Journal of Control and Decision (March 2026; ISSN: 2330-7706). He also contributed to the papers published in IJEER and ITEGAM-JETIA on harmonic filtering and power quality enhancement.
- Prof. (Dr.) J. B. Sarvaiya, Assistant Professor, made four journal contributions, including research on Tasmanian Devil Optimization, Bat Algorithm-based harmonic filtering, nonlinear distributed generation, and Multi-Class Support Vector Machine-based static security assessment. His paper “Smart Variable Selection for Static Security Assessment: A Multi-Class Support Vector Machine Framework” appeared in the International Journal of Engineering Trends and Technology in April 2026 (ISSN: 2231-5381).
- Prof. (Dr.) A. K. Dhandhia, Assistant Professor, contributed two journal papers in the areas of AI-based static security assessment and power quality enhancement using a novel Bat Algorithm, published respectively in the International Journal of Engineering Trends and Technology (April 2026; ISSN: 2231-5381) and IJEER (June 2026; ISSN: 2347-470X).
- Prof. M. U. Ghanchi, Assistant Professor, contributed the journal paper “Power Quality Improvement through Harmonic Filters Using Tasmanian Devil Optimization Algorithm” in ITEGAM-JETIA in March 2026 (ISSN: 2447-0228).

Placement Corner

Electrical Engineering Department Achieves Strong Placement Success in 2025–26 . The Department of Electrical Engineering, Shantilal Shah Engineering College (SSEC), Bhavnagar, recorded a noteworthy placement performance during the Academic Year 2025–26. The placement drive provided students with opportunities through both on-campus and off-campus recruitment, covering core engineering, automation, manufacturing, energy, chemical industries, ports and logistics.

As per the Placement Dashboard, 40+ companies were invited for placement/internship activities, of which 20+ companies engaged in placement activities. A total of 31 students registered for placement, with 17 unique students placed/selected and 21 placement/internship offers generated. The department recorded a 54.84% placement rate and a 67.74% total offer rate, while 4 students received multiple offers. The dashboard records 6 companies with student selections/offers. The highest package was ₹6.50 LPA, the average package was ₹3.25 LPA, and the lowest package was ₹2.16 LPA.

Major Recruiting Organizations

The current-batch placement record includes Iris Automation Pvt. Ltd., APM Terminals (Maersk) Pipavav, L&T Pvt. Ltd., Soham Automation, Windsor Machines Limited, and Gujarat Narmada Valley Fertilizers & Chemicals Ltd. (GNFC).

The on-campus recruitment opportunities included drives at SSEC Bhavnagar, GEC Bhavnagar, BPTI Bhavnagar and online recruitment, while L&T Pvt. Ltd. recruited through an off-campus process.

APM Terminals (Maersk) Pipavav

Two students secured opportunities with APM Terminals (Maersk) Pipavav through On Campus – BPTI Bhavnagar under the Apprenticeship category. Both were selected as Asset Management Apprentice, with a package of ₹2.64 LPA and job location Pipavav.

- Kishan Harshadbhai Parmar — Enrollment No. 230433109028
- Harshal Kiritbhai Raval — Enrollment No. 230433109034

Placement Corner

L&T Pvt. Ltd.

The highest package of the current batch, ₹6.50 LPA, was secured by Kashyap Vimalbhai Thaker, Enrollment No. 230433109043.

He was selected by L&T Pvt. Ltd. through an Off Campus recruitment process as a Graduate Trainee Engineer, under the Graduate Engineer Trainee (GET) category. His job location is Ahmedabad, and his final status is recorded as Joined.

Soham Automation

Soham Automation provided opportunities through On Campus – Online Paid Internship (with Job Opportunity) for the position of Junior Engineer / Intern, with a package of ₹2.90 LPA and job location Ahmedabad.

- Mer Devansh Manishbhai — Enrollment No. 230433109050
- Milan Bharatbhai Solanki — Enrollment No. 210430109004

Windsor Machines Limited

A significant number of students were selected by Windsor Machines Limited through on-campus recruitment. The recruitment was conducted through GEC Bhavnagar as well as SSEC Bhavnagar, under the Graduate Engineer Trainee (GET) category. The designation recorded in the Placement sheet is Graduate Engineer Trainee, with job location Rajkot.

The selected students were:

- Parmar Sanjay Naranbhai — Enrollment No. 230433109029
- Makwana Hardikbhai Maheshbhai—Enrollment No. 230433109022
- Parmar Yash Maheshbhai — Enrollment No. 230433109030
- Pavanji Manharsinh Solanki — Enrollment No. 230433109041
- Kankotiya Brijraj Dineshbhai — Enrollment No. 230433109018
- Mihir Hiteshbhai Sarvaiya — Enrollment No. 230433109036

Placement Corner

- Gohil Harshrajsinh b — Enrollment No. 230433109011

Gujarat Narmada Valley Fertilizers & Chemicals Ltd. (GNFC)

Two students were selected by Gujarat Narmada Valley Fertilizers & Chemicals Ltd. (GNFC) through On Campus recruitment under the Graduate Engineer Trainee (GET) category. Both were offered the position of Graduate Engineer Trainee at Bharuch.

- Vyas Aurosurya Jayeshbhai — Enrollment No. 230433109047
- Mihir Hiteshbhai Sarvaiya — Enrollment No. 230433109036

The department also recorded an excellent achievement from the Batch 2024–25 during AY 2025–26. Four Electrical Engineering students were selected by Reliance Industries Limited (RIL New Energy) through On Campus – LDCE Ahmedabad recruitment.

All four students were selected as Graduate Engineer Trainees (GET) with a package of ₹6.00 LPA, job location Jamnagar.

- Dhapa Vishalbhai Bharatbhai — Enrollment No. 220433109013
- Bambhaniya Pradip Balubhai — Enrollment No. 210430109019
- Abhay Narendrabhai Metra — Enrollment No. 210430109007
- Solanki Dhruv Maheshbhai — Enrollment No. 210430109017

Student Achievement

- Anurag Singh, 4th year student, represented Gujarat at Volleyball Aiff Futsal National championship at Bhopal on 17-28 June, 2026.

Shantilal Shah Engineering College (A Government of Gujarat Institute), Bhavnagar

Electrical Engineering Department

- **Affiliated to the Gujarat Technological University.**
- **Approved by All India Council for Technical Education (AICTE), New Delhi.**
- **Established in the year: 1983-84.**
- **B.E. (Electrical Engineering) program started: 2001.**
- **The department is involved in rendering quality education by offering undergraduate and postgraduate programs in core areas of Electrical Engineering.**



Strength of the faculties

- **12 highly qualified permanent faculty members with the Department.**
- **Faculty members have a very rich blend of experience and qualifications.**
- **Faculty members have attained PG and doctoral qualifications from renowned institutes/ Universities such as SVNIT, PDEU, GTU etc.**
- **Faculty members regularly publish research papers in the National/International Conference, SCI/Scopus/UGC approved journals.**

List of the Facilities available in the department

The Department has 5 well-lit and ventilated classrooms with comfortable seating facilities. Department has following laboratories with modern Equipment.

- Basic Electrical Engineering
- Computer Laboratory
- High Voltage Engineering
- Switchgear and Protection
- Electrical Machines
- Power Electronics
- Basic Electronics
- Analog and digital electronics

- Electrical measurement and measuring instrumentation
- Electrical drives
- Simulation facilities for power system I and II
- Microprocessor and microcontroller
- Project laboratory
- Control theory
- Electrical circuit analysis



Scan for more information or visit
web pages:
<https://www.ssgec.ac.in/>
<http://www.ssec.cteguj.in/>



Other activities/achievements

- Department publishes Vidyutam e Magazine twice every year on 26th January and 15th August. Till date 12 issues are published by the department. Magazine consists of information like technical articles, poem written by faculties and students, reports of expert talks and industrial visits, faculties and student achievements etc.
- Every year students are placed in the companies such as



- Department is arranging industrial Visits, Expert talks on regular basis.
- Sports/cultural events held by department/college every year.
- Students can participate NSS/NCC activities carried out by college or university level.