

CEEAMA Live Wire E-NEWSLETTER

Published by Consulting Electrical Engineers Association of Maharashtra



Read more on this months topic inside.

Electrical Consultants Newsletter Volume No. 4 Issue #49 April 2025

CEEAMA Governing Council Directors



Mr. Chidambar Joshi Hon. President



Mr. Ulhas Vajre Hon. Secretary



Mr. Anil Bhandari Hon. Treasurer

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Mr. Narendra Duvedi Mr. Mohan Kelkar Mr. Ulhas Vajre Mr. Krishna S. Chandavar Mr. Veejhay Limaaye

Mr. Subhash L. Bahulekar Chief Editor - CEEAMA LIVEWIRE

From the Editors Desk,

Welcome to the fresh new financial year FY2025-26! Hope the trade wars and US-Iran escalations are curtailed and nipped in the bud!!

Trump wiped out \$46 billion from Asia's richest including Ambani and Adani on a single day. So if you think geopolitics is for governments to worry about, you are wrong. In just the 6-7 months:

- Oil prices shot up after Red Sea tensions
- Freight rates from Asia to Europe 3x'ed
- Wheat output dipped again, export bans are back, food prices rising
- 1 in 5 Indian SMEs is facing raw material delays due to import shocks.

And few days ago, our own stock market just took a >₹19 lakh crore hit in a single trading day!

India is a developing economy in a highly unstable world. And we're already feeling the heat of the Trump tariffs today! And no founder, employee, or entrepreneur is truly insulated anymore. We're not in a crisis yet but the signals are adding up. Think what can you change, sustain, retain, & grow!

CEEAMA GC meeting for next 2 years' successor planning was conducted on 5th April 2025. Details would be published soon.

We also celebrated CEEAMA's foundation day's 21 years on Gudhi Padava! We are really proud of our founder members who made this dream movement a reality. Sincere tribute to those who are not with us now!

Similar to previous month's subject of Cathodic Protection, this month's topic Viz. Electrical Heat Tracing (EHT) is also highly important one in Oil & Gas industry.

Just like "Cathodic Protection" mindset helps us to keep life's "rust" away, let the "EHT" mind help our life to remain "dynamic and fluid" without any rigidity due to life's low (temperature). Wish you yet another month of safety and happiness!

Subhash L. Bahulekar Chief Editor – CEEAMA





From the President's desk:

Dear Friends,

When I was writing the last month's "Secretary's Desk", little did I realise that it was the last one, and henceforth I will be writing the "President's Desk" for the next tenure.

From the bottom of my heart, I thank the Governing Council of CEEAMA to have bestowed upon me the responsibility – to make CEEAMA bigger, higher and stronger. My predecessor, Mr. Veejhay Limaye's boots are too large for me to fill. With your support only we will be scaling new heights. I seek co-operation and participation of each one of you to make the difference.

We have Mr. Ulhas Vajre who will now be the new Secretary and Mr. Anil Bhandari, an experienced campaigner in the CEAAMA Governing Council will be the new Treasurer. I request all of you to join me in welcoming these gentlemen on board in their new roles.

Along with all other activities that we undertake, we intend to undertake many new initiatives for which we are inviting ideas, concepts and projects that will improve our association. Please feel free to write to admin@ceeama. org regarding your suggestions and ideas. We will discuss and accommodate your thoughts in the Governing Council meetings.

In addition to this, I earnestly request you to please share your experience by using the LiveWire platform. Everyday we come across many professional challenges. Documenting them helps in honing our reporting skills as well as help the fraternity to learn from your experience. I am sure people will benefit by shared learning.

I also request our Associate Members to kindly indicate whether we can have a factory visit conducted at your premises. We could decide based on mutually convenient dates and plan logistics accordingly.

April is a month of religious festivities. Here's wishing you all a very happy April 2025.

Ram Navami wishes (April 6)

Mahavir Jayanti wishes (April 10)

Baisakhi wishes (April 13)

Ambedkar Jayanti (April 14)

Akshaya Tritiya wishes (April 30)

Earth Day is an annual event on April 22 to demonstrate support for environmental protection. On Earth Day consider practicing "earthing" or "grounding" by spending time with your bare feet on the earth, which involves connecting with the Earth's natural energy and potentially reaping health benefits.

Mr. Chidambar Joshi Hon. President CEEAMA

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From the Secretary's desk:

Dear Friends,

At the outset, my Heartiest Greetings to all!

Wishing all the members a very prosperous financial year 2025-26.

I humbly thank the Governing Council of CEEAMA to repose faith in me and entrust the responsibility of Hon. Secretary of our Association and carry forward the great work of preceding Hon. Secretary, Mr. C. V. Joshi, who has been promoted as the President of the Association, and the immediate Past President Mr. Vijay Limaye.

I am also grateful to Mr. Anil Bhandari for assuming charge of Hon. Treasurer and relieving me for taking higher responsibility.

With the support of all the esteemed members, I shall try my level best to serve the Association.

In continuation of the grand success of CEEAMATECH 2024, further technical workshops shall be planned in near future and more avenues to take CEEAMA to new heights be explored.

In conclusion, let me again make an earnest appeal to the CEEAMA members to extend their best possible inspirational support to CEEAMA Live Wire endeavour by way of contributing articles, and case studies.

Sincerely Yours

Mr. Ulhas Vajre

Hon. Secretary

CEEAMA





1.0 **Definition:**

Maintain or raise temperature of equipment using electrical current through tracing cables.

2.0 Purpose:

Trace heating may be used to protect pipes, floors, vessels, instrument enclosures, and other infrastructural surfaces from freezing or fluid coagulation, to maintain a constant flow temperature in hot water systems, or to maintain process temperatures for piping that must transport substances that solidify at ambient temperatures. Electric trace heating cables are an alternative to steam trace heating where steam is unavailable or unwanted.

Trace heating takes the form of an electrical heating element run in physical contact along the length of a pipe. The pipe is usually covered with thermal insulation to retain heat losses from the pipe. Heat generated by the element then maintains the temperature of the pipe.

3.0 **History:**

Since ages, humans discovered various forms of heat sources viz. Sunlight, Geothermal hot springs, and artificial fire to warm/heat up his environment for comfort, cooking, and to thaw solidified fluids for his convenience, and benefits.

In the 18th Century, with the discovery of steam energy, industrial revolution greatly intensified. Steam got many usages including that for frost-prevention of fluids. But it took 20th Century to use electricity for the same.

Electric trace heating began in the 1930s but initially no dedicated equipment was available. Mineral insulated cables ran at high current densities to produce heat, and control equipment was adapted from other applications. Mineral-insulated resistance heating cable was introduced in the 1950s, and parallel-type heating cables that could be cut to length in the field became available. Self-limiting thermoplastic cables were marketed in 1971.

Control systems for trace heating systems were developed from capillary filled-bulb thermostats and contactors in the 1970s to networked computerized controls in the 1990s, in large systems that require centralized control and monitoring.

International standards applied in the design and installation of electric trace heating systems include IEEE standards 515 and 622, British standard BS 6351, and IEC standard 60208.

4.0 Types:

A) Constant electric power "series"

A series heating cable is made of a run of high-resistance wire, insulated and often enclosed in a protective jacket. It is powered at a specific voltage and the resistance heat of the wire creates heat. The downside of these types of heaters is that if they are crossed over themselves, they can overheat and burn out, they are provided in specific lengths and cannot be shortened in the field, also, a break anywhere along the line will result in a failure of the entire cable. The upside is that they are typically inexpensive (if plastic style heaters) or, as is true with mineral insulated heating cables, they can be exposed to very high temperatures. Mineral insulated heating cables are good for maintaining high temperatures on process lines or maintaining lower temperatures on lines which can get extremely hot such as high temperature steam lines. Typically, series elements are used on long pipe line process heating, for example long oil pipe lines and quay side of load pipes on oil refineries.

B) Constant wattage

A constant wattage cable is composed of multiple constant electric power zones and is made by wrapping a fine heating element around two insulated parallel bus wires, then on alternating sides of the conductors a notch is made in the insulation. The heating element is then normally soldered to the exposed conductor wire which creates a small heating circuit; this is then repeated along the length of the cable. There is then an inner jacket which separates the bus wires from the grounding braid. In commercial and industrial cables, an additional outer





jacket of rubber or Teflon is applied.

The benefits of this system over series elements are that, should one small element fail, then the rest of the system will continue to operate, on the other hand damaged sections of cable (usually 3 ft span) will stay cold and possibly lead to freeze ups in said section. Also, this cable can be cut-to-length in-field due to its parallel circuitry, however, due to the circuit only running to the last zone on the cable, when installing on site you normally have to install slightly beyond the end of the pipe work. When installing constant wattage, or any



heat tracing cable, it is important to not overlap or touch the cable to itself as it will be subject to overheating and burnout. Constant wattage cable is always installed with a thermostat to control the power output of the cable, making it a very reliable heating source.

The disadvantage of this cable is that most constant wattage cables do not have soldered connections to the bus wires but press on type contact and are therefore more prone to have cold circuits due to loose connections caused by cable manipulation and installation.

C) Self-regulating

Self-regulating heat tracing tapes are cable whose resistance varies with temperature - low resistance for temperatures below the cable set point and high resistance for temperatures above the cable set point. When the cable temperature reaches the set point the resistance reaches a high point and resulting in no more heat being supplied.

These cables use two parallel bus wires which carry electricity but do not create significant heat. They are encased in a

semi-conductive polymer. This polymer is loaded with carbon; as the polymer element heats, it allows less current to flow so the cable is inherently power saving and only delivering heat and power where and when required by the system. The cables are manufactured and then irradiated and by varying both the carbon content and the dosage then different tape with different output characteristics can be produced. The benefits of this cable are the ability to cut to length in the field. It is more rugged, and much more reliable than a constant wattage cable; it cannot over-heat itself so it can be crossed over, but it is bad practice to install tape in this way. Self-regulating and constant wattage heating cables have specific maximum exposure temperature, which means that if they are subject to high temperatures then the tape can be damaged beyond repair. Also, self-limiting tapes are subject to higher inrush currents on cold starting up similar to an induction motor, so a higher rated contactor is required.

5.0 Engineering:

The design of an electrical trace heating system is complex, with information needing to be drawn from many sources at different phases of the project execution. Frequently, the electrical trace heating system design package is not available/complete until a late stage in the project execution, and is usually issued as a bulletin to the main electrical construction contract.

A) Consideration:

- Environmental conditions (IP ratings)
- Hazardous areas
- lowest ambient design temperature
- Control method (e.g., thermostats)
- Pipe material, size and length
- Pipe fitting type
- Insulation type and thickness
- Fluid flow conditions
- Areas of heat loss (e.g., supports, pump bases)
- Maintenance access (manholes)

B) Design philosophy:

- A continuous and reliable service
- Safety to personnel and equipment
- Ease of maintenance & interchangeability
- Standardised on one cable output rating

C) Design Inputs:

P&ID, Instrument types /Hook Ups, Piping Isometric diagrams, Plot Plan, Equipment Layout and Piping BOM including Piping Line List and Insulation Summary sorted to provide a breakdown of electrically traced lines only.

D) Typical BOM:

- Heating cable
- Temperature controller (thermostats)
- Temperature transmitters
- End connectors / Power connectors
- Cables from Control Panel to tracer
- Glass Tape /Pipe Strap/ Tie wires/clamps
- Junction boxes / RTD enclosures
- Cable glands, lugs
- Joints, splices, and end seals Earthing
- Caution Lables

E) Distribution board:

- Isolating Transformer (1/3 phase)
- Isolation & protection (Fuse, Contactor/SS controller, O/C, E/F, RCBO, etc.)
- Continuity monitor and low current alarms
- RTD inputs and controllers
- Metering, indications, and misc. accessories.

F) Application in Hazardous Area:

Typically, the electrical enclosures (DB, etc.), End connectors, Power connectors, and accessories required would be Ex'd' type. The temperature associated with the TRating shall not exceed the autoignition temperature (<80%) of the flammable or combustible materials that may be present.

G) Engineering Deliverables:

- Sizing Calculations (cable suppliers' software: i) Pentair Tracecalc, ii) Thermon Computrace)
- Heat Tracing power layout
- SLD, JB looping diagram
- Heating Schedule, and BOM/MTO

6.0 Installation procedure:

The heating tape runs on the underside of the pipe, strapped every 300mm with fixing fibre tape.

"Warning – Electric Trace Heating" labels installed in a visible position on the insulation weather barrier, at intervals not exceeding 3 metres.

Short pipe spur lengths tee-ing off from a main pipe run is heat traced by looping the cable up and down the tee'd length from the main run.

Ambient thermostat is used to energise the trace heating distribution board set at desired temp.

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Ensure that the heating cable installation is protected from both mechanical damage and effects of the weather, until the thermal insulation is applied.

7.0 Recommended Vendors:

Raychem / Thermon / Bartec / Emerson / Danfoss / Pentair

8.0 Market Outlook

Global Electric Heat Tracing market accounted for \$1.54 billion in 2019 and is expected to reach \$3.36 billion by 2027 growing at a CAGR of 10.2% during the forecast period. Rising demand for energy-efficient electric heat tracing systems and low maintenance cost associated with electric heat tracing systems are the major factors driving the market growth.

9.0 References/courtesy/Disclaimer:

Various sources have been used to compile the information presented in this article, some of which are Thermon, AIChE, Inst Tools, Wikipedia, Prigol engg., Trade India, Heatingelementsplus and Businesswire.com. Although every attempt has been made to ensure the accuracy of this material, neither CEEAMA nor any of its contributors to this publication assumes responsibility for any inaccuracies or omissions in the data presented. As a safety precaution, information utilized from this publication should be verified from the relevant sources.

Contributor

Subhash Bahulekar

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-

ABSTRACT

Electrical heat-tracing refers to the continuous or intermittent application of heat on the piping, equipment, and instrumentation where fluid (water or other product) may be exposed to low temperature/freezing conditions. Whenever the contents of a pipe or vessel are maintained at temperatures exceeding the ambient temperature, there will be a flow of heat from the product to the external air. Insulation will slow the heat loss, but will not prevent it. Heat tracing is a method to provide the supplemental heat just enough to compensate for the heat loss due to lower ambient temperature.

The general intent of heat tracing is either tracing for winterization and/or tracing for process maintenance. Winterization tracing is designed to protect the product from freezing and is typically designed to operate when the ambient temperature falls below a certain level.

Heat tracing for process maintenance is commonly used where higher temperatures must be maintained for the purpose of reducing product viscosity and/or preventing wax or hydrate from forming in the product.

TYPES OF ELECTRIC HEAT TRACING SYSTEMS

Electric trace heating cable can be divided into four distinct product classifications:

- 1. Series circuit, Mineral insulated (MI) cables (constant watt output)
- 2. Parallel circuit heating cables (constant watt output)
- 3. Self-regulating heating cables (variable watt output)
- 4. Skin effect heating Self-Regulating Heat Tracing

1. SERIES CIRCUIT MINERAL INSULATED (MI) CABLES

Series resistance-type heater cables use single or multiple resistive conductors to create a heating circuit. Power output of these cables is relatively constant and as voltage is applied, the power output is determined by a combination of the length of the cable and the overall resistance of the conductor.

Features:

- Power output of these cables is relatively constant, and they do not exhibit self-regulating characteristics;
- Suitable for high temperature and harsh environments;
- Voltage up to 600VAC; Wattage output up to 80 W/ft;
- Long circuit lengths (up to 4000 ft.); Uniform power along the entire length;
- Copper construction: Maintain up to 300°F, Exposure up to 482°F;
- Alloy construction: Maintain up to 1500°F, Exposure up to 1750°F;

Application:

• Designed for very high-temperature environments, such as industrial processes requiring temperatures up to 550°C (1022°F).

2. PARALLEL CIRCUIT HEATING CABLES (CONSTANT WATT OUTPUT)

Parallel circuit cables are constant watt arrangement designed to put out a certain amount of wattage per linear foot of cable. Provides a fixed amount of heat output regardless of the surrounding temperature. Typically used in areas where steady heat is required. Ideally suited for applications where a particular watt

density is required at all times such as freeze protection and many other low temperature process control applications.

Features:

- Standard 120V, 240V and 480V operation;
- Maintain up to 500°F, Exposure to 650°F; Output limited to 16 W/ft;

Application:

• Suitable for long pipe runs and high-temperature applications, such as maintaining the viscosity of fluids like oils or chemicals.

3. SELF-REGULATING HEATING CABLE

Self-regulating heating cables are the latest advance in electric cable products. They are designed and built to regulate their output per the process needs i.e. as the process temperature drops, the cable's output increases; conversely, as the temperature rises, the cable's output decreases.

Automatically adjusts its output based on the ambient temperature. Maintains uniform temperature profile throughout the pipeline which results in greater energy economy; Intrinsically safe and can be used in hazardous areas. In fact, it has been given an unconditional T-rating* (see section -4 under "Area Classification"); Cut-to-length in field, easy installation; The tracer once installed, generally do not require any replacement for the entire life of the plant.

Features:

- These cables may be cut to any length without changing the overall resistance of the cable
- The self-regulating type tracers are usually guaranteed for more than 40 years of working life; Ideal for applications requiring temperature maintenance or freeze protection.
- Adjust the power output i.e. increases power as temperature falls and decreases as temperature rises;
- Standard 120V and 240V operation;
- Maximum circuit lengths are typically 150 to 600 ft;
- Maintain up to 250°F, exposure up to 375°F;

Applications:

• Ideal for freeze protection and maintaining process temperatures in pipelines, tanks, and vessels. They are energy-efficient and safe for use in hazardous areas.

4. SKIN EFFECT HEAT TRACING

The skin effect heating system is a specialized electrical heating method used primarily for long pipelines, offering efficient and uniform heat distribution.

In Skin-effect Tracing System (STS), heat is generated on the inner surface of a ferromagnetic heat tube that is thermally coupled (welded) to the pipe to be heat traced. A non-magnetic conductor material (copper or aluminum) is placed inside the heat tube and connected to the tube at the far end. The tube and conductor are than connected to an AC voltage source in a series connection. When the voltage is applied in this manner, the current in conductor flows in one direction and returns through the steel tube in the opposite direction. The full current flows in inner surface of the steel tube and in its outer surface the current is virtually absent. This method of heating is called skin-effect heating because the return path of the circuit current is pulled to the inner surface (approximately 1 mm) of the heat tube by both the skin and the proximity effect between the heat tube and the conductor.

When the system is powered by high voltage (3 to 5kV) heat output occurs in both conductors. If the system is properly designed, 60 to 80% of heat output takes place in the steel tube, and only 20 to 40% in the inner conductor.

Features :

- Most economical method for extremely long pipe lengths up to 30 miles can be traced with a single electric supply point. This makes it most suitable for cross-country pipelines;
- The allowable circuit length is determined by the power output, heat tube size, conductor size, and the carrier pipe temperature

Applications:

• Ideal for long-distance pipelines in industries like oil and gas, where maintaining fluid flow over extended lengths is critical.

INSTALLATION COMPONENTS OF ELECTRICAL HEAT TRACING

Electrical heat tracing systems consist of several key components that work together to maintain or raise the temperature of pipes and equipment. Here are the main Heat tracing cables: These can be self-regulating heating cables, constant watt cables, or power-limiting cables, applied to piping and tanks.

- Control panel or thermostat: Used to regulate the temperature and ensure efficient operation.
- Power connection box: Connects the system to the power source.
- Ambient temperature sensor: Monitors environmental conditions to adjust heating accordingly.
- Light indicators: Provide visual monitoring of system output.
- Cable termination box: Ensures proper electrical connections and safety.
- Heating cables: The core component, typically self-regulating, constant wattage, or mineral insulated, designed to heat up when electricity passes through them.
- Insulation: Used to minimize heat loss and improve energy efficiency.

INSTALLATION OF ELECTRICAL HEAT TRACING

Installing an electrical heat tracing system requires careful planning and execution Here's a general stepby-step guide:

1. **Pre-installation Check**

- Inspect pipes or surfaces for cleanliness.
- Verify the heat tracing system specifications match the application requirements.
- Ensure all cables, control panels, and accessories are available.

2. Cable Layout & Attachment

- Unroll the heating cable and lay it along the pipe or equipment.
- Secure the cable using approved fasteners (cable ties, adhesive tapes, or bands).
- Maintain the recommended spacing to avoid overheating.

3. **Power Connection**

- Connect the heating cable to the power supply using a power connection box.
- Follow manufacturer instructions for proper wiring and grounding.
- Ensure the connection is weatherproof if used outdoors.

4. Temperature Sensor Placement

- Install ambient or surface temperature sensors to regulate heat output.
- Position sensors in areas representative of actual heat loss.

5. **Insulation Application**

- Wrap the pipe or equipment with insulation material to retain heat.
- Ensure insulation thickness meets heat tracing requirements.
- Seal insulation layers properly to prevent moisture intrusion.

6. System Testing & Commissioning

- Perform electrical continuity and resistance tests before energizing.
- Gradually apply power and monitor temperature response.
- Verify automatic regulation using the control panel or thermostat

CODES AND STANDARDS

IEC Standards

- 1. IEC 60079-30: Focuses on electrical resistance trace heating for explosive atmospheres.
- 2. **IEC 62395**: Covers general requirements for electrical resistance trace heating systems used in industrial and commercial applications.

NEC Standards

- 1. **NEC Article 427**: Provides requirements for fixed electric heating equipment for pipelines and vessels, including heat tracing systems.
- 2. **NEC Article 500**: Addresses the installation of electrical equipment in hazardous locations, which can include heat tracing systems.

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Changes in Maharashtra power tariffs

NASHIK: MSEDCL, with the highest electricity tariff across the state, will see a 10-30% drop in rates for residential consumers from April 1, as per the latest order of the Maharashtra Electricity Regulatory Commission (Merc).

The Merc's new multi-year tariff order, published on their website, marks an unprecedented decrease in electricity rates across all consumer categories. "

Against the MSEDCL's projected revenue gap of Rs 48,066 crore, MERC has approved a revenue surplus of Rs 44,480 crore as a part of the reconciliation of past discrepancies and future forecasts for power procurement and revenue generation. The commission has passed this surplus to the consumers by lowering the tariff between 10% and 30% in various categories for the next five years," stated a senior MSEDCL officer from Nashik Zone, citing Merc's press release.

Merc attributed the rate reduction to two key factors — MSEDCL's failure to curb distribution losses at 14% (actual losses were 22%) and the anticipated cost savings from future renewable energy generation. As a result, Merc decreased cross-subsidies for high-tension (HT) and low-tension (LT) industries by 12% and 8%, respectively. This led to a 15% and 11% reduction in bills for HT and LT consumers.

Siddharth Varma, secretary of Veej Grahak Samiti in Nashik, and former Merc consumer representative, said, "This is a good step by MERC. There are certain charges whose applicability is not clear. The bills generated for April will bring some clarity. We, however, expect the relief to be around 10-15%."

Varma said Merc exempted residential consumers with rooftop solar panels from 'Time of Day' charges, supporting green energy initiatives. Legal practitioners' offices throughout the state would now receive bills under public service category rates, instead of commercial rates, he said.

"We raised the issue with the commission, pointing out that there was no change in the tariff despite the Aurangabad bench of the Bombay high court already seeking the change in the tariff, there are a large number of cases regarding non-compliance by MSEDCL. They were filed before the consumers grievances redressal forum Nashik" Varma said.

In what will ensure that industries from Maharashtra do not migrate to other states, the average billing rate for the existing industry tariff across the state, which was Rs 10.85 per unit, has been reduced to Rs 9.20 per unit for MSEDCL consumers from April 1.

MSEDCL managing director Lokesh Chandra said, "Residential tariffs will fall in the next few years. Our proposed procurement of energy through solar power will result in a reduction of the overall cost of power procurement and reduce tariffs and also cross-subsidy burden on consumers."

Reference : <u>https://timesofindia.indiatimes.com/city/nashik/changes-in-maharashtra-power-tariffs-10-30-</u> reduction-in-charges-from-april-1/amp_articleshow/119725596.cms

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WINNERS OF QUIZ MARCH 2025

ANKIT SHAH

SUDHANSHU SEKHAR JHA

SHADAB KHAN

RADHIKA

GANESH DAHALE

Congratulations

QUIZ APRIL 2025

- 1. Dyn11 is vector group notation of transformer. It means:
 - A. HV winding is delta connected
 - B. LV winding is star connected
 - C. LV winding is 30 degrees lagging by HV winding
 - D. All of the above

2. Split AC consists of:

- A. two units; Indoor Unit and Outdoor Unit.
- B. One unit split into multiple parts.
- C. window installation split into 2 parts of indoor and outdoor
- D. None of the above
- 3. Electrical Equipment Routine Test Report includes:
 - A. Short Circuit test
 - B. Insulation Resistance test
 - C. Impact test
 - D. All of the above

4. National Electrical Code:

- A. NEMA 32
- B. IEC 61439-4
- C. NFPA 70
- D. CEA 2025
- 5. SS standards are applicable in:
 - A. Sierra Leone
 - B. Singapore
 - C. Siberia
 - D. Saudi Arabia
- 6. Chemical oxidation is a reaction where an atom or molecule gives up _____:
 - A. Electron
 - B. Cathode
 - C. Proton
 - D. Positron
- 7. Regulations by DOT-USA require Pipelines to be protected by cathodic protection:
 - A. False
 - B. True
- 8. CP design in hazardous area must account for:
 - A. Ex-proof enclosures
 - B. Intrinsically safe circuits
 - C. Earthing and Bonding
 - D. All of the above
- 9. Voltage drop in a cable depends upon:
 - A. Conductor Size
 - B. Length of Cable
 - C. Current flowing through the cable
 - D. All of the above

- 10. Purpose of Space Heaters inside Switchgear panel:
 - A. Increase panel's temp. to rated value
 - B. Remove hazardous gases
 - C. Remove moisture
 - D. Prevent loosening of joints

Rules for the QUIZ:

- The Quiz will be open for 10 days from the date of EMAIL.
- Each correct answer received on DAY 1 will get 100 points
- Next days the points will reduce as 90 80 70 and on 10th day points will be ZERO even if the
- answer is correct.
- All participants will receive E certificate signed by CEEAMA President with the points earned
- mentioned on the same.

Please use following google form link to participate in the QUIZ.

https://forms.gle/3Vvwr7hGibe3MGFb7

"Thank you all for the overwhelming response to the E-NEWS in general and E-Quiz in particular. MCQ based quiz is always tricky and surprisingly can take us aback when we realise our conceptions (misconceptions) about the subject / system / product.

The aim of the feature was to create inquisitiveness in your mind and help you check your technical quotient

quickly. The response will also help us to present articles and webinars on subjects which are important, but which

lack enough awareness / knowledge in general.

It can open a pandora box for our discussions and arguments and probable solutions. Engineering evolves with conception. It gets fuelled with community discussions and capitalist actions. All stakeholders start realising the need to take a closer look and help improve standards as we have seen in the past century. Surely it makes the world a better place.

Wish you all a better luck this time.

Do spread the word.

March 2025 Quiz Answers

- 1. B. Battery Energy Storage System
- 2. D. None of the above
- 3. A. Protect pipes, floors, vessels, etc. from freezing
- 4. C. Type of motor starters selected for SC conditions
- 5. C. Both A & B
- 6. A. Ex ec, Ex eb
- 7. C. Srinivasa Ramanujan
- 8. C. 400 MHz, 600 MHz & 1.4 GHz
- 9. B. 1.5 mm
- 10. D. cal/cm2

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CEEAMA Live Wire E-NEWSLETTER

Published by Consulting Electrical Engineers Association of Maharashtra

Electrical Consultants Newsletter Volume No. 4 Issue #49 APRIL 2025

A-103. Sanpada Railway Station Building, 1st floorSanpada East, Navi Mumbai – 400705 Email: admin@ceeama.org