



**"DESIGN OF A RELIABLE AND COST EFFECTIVE ADVANCED ELECTRICAL POWER SYSTEM FOR INDUSTRIAL APPLICATIONS"**

**(23-25 Jan 2018 at Hyderabad)**

**About the course and its benefits:**

Ensuring reliable operation of plant by implementing LRNG (low resistance neutral grounding) and HRNG (high resistance neutral grounding) are covered. Symmetrical components and short circuit calculation are covered so that participants can carry out design calculation related to resistance grounding technique. Different types of faults and causes of equipment failures in plant are covered. Basics of Generator protection and Excitation system are covered so that participants can appreciate the design and selection of resistance grounding techniques. The course will also cover basics of Electrical system and Single line diagram in a plant to help engineers to recall their basic knowledge. Energy savings that can be obtained from various electrical equipments are covered briefly.

**Learning Outcomes and course objectives:**

At the end of this program participants can select, design, specify appropriate Neutral grounding techniques of a plant. Participants will also get some idea about short circuit calculation, generator protection, electrical energy saving.

**Who can attend this workshop/training program?**

Engineers from utilities who specify and review new projects. Engineers from EPC companies and design firms who design a plant. Engineers from Neutral grounding equipment manufacturing companies. Students who intent to make a career in Electrical plant design.



## Course Outlines:

Day 1, 1<sup>st</sup> half: Brief overview of design of plant Electrical system including Various buildings inside the plant

Review Single line diagram of plant with Captive power generation, MV Motors, supplying various plant load, Buildings etc. -	1.5hr
Tea break	
Description of Plant Electrical system consisting of CHP generator, Unit transformer, MV LV Switchgear, Motor starters, Variable frequency drives, Surge arrestors, etc	1.5hr

Day 1, 2<sup>nd</sup> half: Electrical Energy savings in plant, Single line to ground fault current calculation using symmetrical components method

Breakup of Electrical losses in a plant, Energy efficient transformers, Use of Bus ducts, Energy efficient motors, variable frequency drives	1.5hr
Tea break	
Convert a 3Phase SLD to a zero, positive and negative sequence network. Sequence networks for 3phase, line to line and SLG fault. Positive, negative and zero sequence impedance of generator, transformer, cable etc.	1.5hr

Day 2, 1<sup>st</sup> half: LRNG (Low resistance neutral grounding) for reliable operation of MV system with big motors

Various type of faults in MV Motors, Arc fault in MV motors and welding of stampings, Arc energy equation. Brief overview of MV motor Protection.	1.5hr
Tea break	
Calculation of MV motor neutral current and Neutral grounding resistor Specification of Neutral grounding resistors	1.5hr

Day 2, 2<sup>nd</sup> half: HRNG (High resistance neutral grounding) for reliable operation of Unit connected generators in Captive power plants



Generator protection basics, Generator excitation system overview, Capacitive charging currents in a system. Winding fault. Arc energy in a generator during fault.	1.5hr
Tea break	
Calculation of Neutral current, Design of neutral grounding resistor and Neutral grounding transformer, Specification of neutral grounding transformer.	1.5hr

Day 3, 1<sup>st</sup> half: Effect of inherent Third harmonics in Parallel operation of MV bus connected generators

Various Configuration of generator paralleling Methods to reduces third harmonic in generator	1.5hr
Tea break	
Detection of High resistance arc fault Inside switchgear using optical sensors.	1.5hr

Day 3, 2<sup>nd</sup> half: Q&A session, discussion

Quick review of what we have learnt	1.5hr
Tea break	
Q&A session, discussion, distribution of certificates.	1.5hr



# Centre For Industrial Solution and Advanced Training

AN ISO 9001:2015 CERTIFIED

(Technical- Electrical/Mechanical/Automation/Chemical, Behavioral& Soft Skill, Safety, Business Excellence, Safety &Energy Audit)

"A complete Training Solution Under One roof"

## Registration:

**Dates of the program:** 23-25 Jan 2018 (Tuesday- Thursday) at Hyderabad.

**Participation fees:** 27000/- per delegate (Excluding GST@18%; Training program includes training material hard copies, Tea, Lunch & snack, excluding lodging and Boarding)

**Payment:** ECS/NEFT/DD in favor of "Centre for Industrial Solution and Advanced Training" Payable at Nagpur, Maharashtra, India. Account No: 0509102000003353  
Bank: IDBI, Wardha- 442001, MS, India; IFSC Code: IBKL0000509; Swift Code IBKLINBB007; MICR Code 441259001.

**Venue:**@Hyderabad

**For Registration, please do contact to,**

**We prefer on line Registration through our web [www.cisat.co.in](http://www.cisat.co.in).**

1. Mahendra Dhande 09168326662,
2. 00-91-8669546332; 7709012815; [vikas@cisat.co.in](mailto:vikas@cisat.co.in); [cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com);

\*\*\*\*\*

Contact for any In-house Training Program at your plant or location.

## Centre For Industrial Solution and Advanced Training

Web: [www.cisat.co.in](http://www.cisat.co.in); Email: [cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com) ; Contact: +91-

7709012815; 8669546332

(GST Code:27ABBPW5589J1ZV; SAC Code 99-9293; State Code 27; PAN No: ABBPW5589J)

"A Complete Training Solution under One roof"

(Technical- Electrical/Mechanical/Automation/Chemical, Behavioral, Soft Skill, Safety, Out Bound training, Business Excellence, Safety Audit, Energy Audit, Automation Solution)

**Branch Office:** A-306 Creative Home Apartment, Friends Colony, Anupam Society, Nagpur-440015, MS, India.

Web:[www.cisat.co.in](http://www.cisat.co.in); Email:[cisat.nagpur@gmail.com](mailto:cisat.nagpur@gmail.com) ; Contact:+91- 7709012815(Branches: Thane/Pune/Nagpur/Bhilai/Wardha)

(Your partner for industrial solution & Empowerment of Human Capital)