



EE356: Electrical Transmission System (33kV and Above Overhead Line Transmission)

Training Description:

This intensive five-day training course provides participants with a comprehensive understanding of electrical transmission systems focusing on overhead lines at 33kV and above. The training course covers design, construction, operation, maintenance, protection, and safety practices. Real-world case studies, standards, and troubleshooting techniques will be integrated to ensure participants gain both theoretical knowledge and practical applications necessary for efficient and reliable transmission line operations.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the fundamentals and key components of high-voltage overhead transmission lines
- ✓ Interpret electrical transmission line design considerations, materials, and standards
- ✓ Identify operational principles, power flow, and grid integration at transmission levels
- ✓ Apply preventive, predictive, and corrective maintenance practices
- ✓ Implement transmission line protection systems, fault detection, and troubleshooting
- ✓ Apply best practices for safety, reliability, and sustainability in overhead transmission systems

Training Designed for:

This training course is intended for Transmission & distribution engineers, Electrical maintenance engineers and technicians, Utility and power plant operators, Project engineers and site supervisors, Electrical inspectors and consultants and Safety officers and technical specialists in power utilities.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

❖ Fundamentals of Electrical Transmission Systems

- Introduction to power transmission (33kV and above)
- Transmission vs. distribution systems
- Overview of transmission system components: towers, conductors, insulators, grounding, hardware
- Electrical standards and codes (IEC, IEEE, local regulations)
- Power flow basics: voltage levels, current, and line losses
- Case study: Structure of a typical 33kV–132kV overhead transmission line

DAY TWO:

❖ Transmission Line Design and Construction

- Route survey and selection criteria for overhead lines
- Tower types, materials, and structural considerations

- Conductors: types (ACSR, AAAC, etc.), sizing, and sag-tension analysis
- Insulation coordination and selection of insulators
- Ground wires and lightning protection systems
- Construction methods: stringing, erection, and commissioning
- Environmental and right-of-way considerations

DAY THREE:

❖ Operation and Maintenance of Overhead Lines

- Transmission system operation principles
- Line performance: efficiency, voltage regulation, corona effect
- Routine and preventive maintenance techniques
- Condition monitoring: thermography, vibration analysis, drone inspections
- Live-line maintenance methods (hot stick, barehand, insulating gloves)
- Emergency restoration systems (ERS) and rapid recovery after faults
- Practical workshop: Identifying maintenance defects in overhead lines

DAY FOUR:

❖ Protection, Faults, and Troubleshooting

- Protection schemes for transmission lines (overcurrent, distance, differential, pilot protection)
- Substation interface and relay coordination
- Fault types (single-line-to-ground, double-line, three-phase) and their impact
- Fault location methods (impedance, traveling wave, digital relays)
- Protection of 33kV–400kV overhead lines against lightning and surges
- Troubleshooting case studies and problem-solving exercises

DAY FIVE:

❖ Safety, Reliability, and Future Trends

- Safety practices and regulatory compliance for high-voltage transmission systems
- Electrical hazards and risk assessment in overhead line work
- Reliability improvement strategies (redundancy, smart monitoring, grid modernization)
- Integration of renewable energy with transmission networks
- Emerging technologies: smart grids, HVDC, UHVAC, digital substations
- Exercise: Developing a transmission line maintenance & safety plan

❖ Course Conclusion

❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Group and Corporate Discounts:

- We offer group and corporate discounts on many courses. These discounts are available for clients who want to maximize their return on investment.

Individual Discounts:

- We offer individual discounts on many courses for people who are self-sponsored and make their payment in full and upfront at the time of registration

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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