TRANSMISSION CORPORATION OF TELANGANA LIMITED
Vidyut Soudha, Khairatabad:: Hyderabad – 82

Website: www.tstransco.in CIN: U40102TG2014SGC094248

A B S T R A C T

TSTRANSCO–CTI–TRAINING–Conducting Online Live Training program on "Transmission System: Safety, Maintenance and Restoration Techniques (TS-SMART)" for all the O&M Staff, Artisans (Gr-I & II), SMGs working in EHT Substations and CBD Gangs of TSTRANSCO –Orders – Issued – Regarding.

T.O.O. (CE-Trg) Rt.No.1953 **Dt:19.09.2020**

Read the following:-

Ref: Note approval of the Chairman and Managing Director vide regd.No.1485, Date:17.09.2020

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ORDER:

1. Since its inception in 2014, TSTRANSCO has made rapid strides in the transmission sector. In the last six years, the transformation capacity has increased from 14973 MVA to 36012 MVA, 120 new EHT substations have been added to the grid, the EHT line length has increased from 16379 CKM to 25826 CKM, maximum grid consumption has gone up from 128 MU to 255 MU, and met a peak demand of 13,168 MW.
2. As the transmission system has grown exponentially, its efficient management has also become a top priority- to preserve valuable assets and to increase their lifespan. Employees working in substations and lines have to keep abreast of the latest developments taking place in the sector for efficient management and maintenance of the systems.
3. Also, TSTRANSCO places highest priority on transmission system security, emergency management and safety of its employees. Awareness should be raised from time to time on precautionary measures to be taken to prevent accidents and damages to the equipment, structures in substations and lines, and accidents to the personnel working. Besides preventing accidents, proper training is essential on the first aid to the victims in the event of any electrical or fire accidents.
4. Keeping in view the above, the management has directed Corporate Training Institute (CTI)/TSTRANSCO to conduct a suitable training program to all its employees working in EHT Substations and Lines.
5. Accordingly, CTI has designed a training program on safety, maintenance and emergency management aspects of Substations and Lines -"Transmission System: Safety, Maintenance and Restoration Techniques (TS-SMART)"- to nearly 3000 workmen looking after the maintenance of Substations and Lines in TSTRANSCO. Separate modules are prepared for the staff working in Substations and Lines as per Annexures-I&II.

6. Because of the prevailing COVID-19 pandemic, it is decided to conduct the above training program online in live mode. The participants shall participate in the live training program from their respective workplaces.
7. The TS-SMART online live training program is divided into the following two parts:

   Part-1: For O&M Staff, Artisans (Grade-I & II) and Special Maintenance Gangs (SMGs) working in EHT Substations:

   The Part-I of the training program on EHT substation maintenance, emergency management and safety will be organized for about 2600 employees, in 5 batches, with each batch comprising around 500 employees of O&M Staff and Artisans working as Substation Operators and Special Maintenance Gangs (SMGs). The duration of the program for each batch is 8 days. To have uninterrupted shift duties at EHT Substations, it is proposed to maintain a break of 2 days in the training program.

   Part-II: For CBD gangs working in EHT Lines.

   The Part-II of the training program on EHT Line Maintenance and Safety will be organized for nearly 400 employees of O&M staff and Artisans (CBD gangs) in 2 batches, with each batch comprising around 200 employees. The duration of the program for each batch is 5 days.
8. The Chief Engineers/Zone shall nominate field engineers to coordinate the above training program
   a. One AE / ADE (Electrical) from each circle as Coordinator, for every 10 participants.
   b. One Divisional Engineer (Electrical) / ADE (Tech) to Superintending Engineer (OMC) from each circle as a Mentor.
   c. One AE / ADE (Telecom) from each Zone to assist in network-related issues.
   d. Divisional Engineer (Tech) to Chief Engineer (Zone) as Zonal Coordinator.
9. The Divisional Engineers (Electrical) are authorized to make local adjustment of Artisans within a division while nominating Artisans for the training program, for smooth shift operations in substations.
10. The controlling officers shall spare the services of the departmental nominated faculty to deliver lectures on the scheduled dates for the training program.
11. The FA&CCA(Accounts) is authorized to release the budget for an amount of Rs.5,50,000/- (Rupees Five Lakhs Fifty Thousand Only) at the rate of Rs.50,000/- (Rupees Fifty Thousand only) for respective circles, as per Annexure –III, for meeting the expenditure towards conducting the above training for arranging basic infrastructure in the field: Internet Connectivity, Speakers, Microphone etc.
12. The Chief Engineers/Zone shall arrange nominations of employees in 7 batches and the list of Coordinators, Mentors and Zonal Coordinators as per the proforma enclosed in Annexure – IV&V and communicate to Chief Engineer/Training before 24.09.2020.

13. The Chief Engineer/Training/CTI shall prepare a schedule and organise the online live training program batch wise accordingly.
14. The order is issued with the concurrence of the Joint Managing Director/ TSTRANSCO vide Regd. No. 3598, Dated:19.09.2020

These orders are available on TSTRANSCO website and can be accessed at www.tstransco.in

(BY ORDER AND IN THE NAME OF TRANSMISSION CORPORATION OF TELANGANA LIMITED)

C. SRINIVASARAO, I.R.A.S.
CHAIRMAN & MANAGING DIRECTOR (I/C)
TSTRANSCO

Encl: Annexure – I,II,III,IV and V.

To

1. The Chief Engineer/ Training/TSTRANSCO/CTI/Hyderabad
2. The Chief Engineer/ Metro Zone/ Hyderabad
3. The Chief Engineer/Rural Zone/ Hyderabad
4. The Chief Engineer/Warangal Zone/ Warangal
5. The Chief Engineer/Karimnagar Zone/ Karimnagar
6. The FA&CCA(Accounts)/TSTRANSCO/Vidyut Soudha/Hyderabad

Copy to:

1. The Executive Director(Finance)/ TSTRANSCO/Vidyut Soudha/ Hyderabad
2. The Chief General Manager(HRD)/ TSTRANSCO/Vidyut Soudha/ Hyderabad
3. The Joint Secretary/TSTRANSCO/Vidyut Soudha/ Hyderabad
4. The Chief Engineer/Telecom/TSTRANSCO/Vidyut Soudha/ Hyderabad
5. The Chief Engineer/ IT/TSTRANSCO/Vidyut Soudha/Hyderabad
6. The Chief Engineer/Transmission/TSTRANSCO/Vidyut Soudha/ Hyderabad
7. The Chief Engineer/Construction/TSTRANSCO/Vidyut Soudha/ Hyderabad
8. The Chief Engineer/400KV/TSTRANSCO/Vidyut Soudha/ Hyderabad
9. The Chief Engineer/400KV/Warangal
10. The Chief Engineer/LIS/VS&Field/TSTRANSCO/Vidyut Soudha/ Hyderabad
11. The Chief Engineer/SLDC/TSTRANSCO/Vidyut Soudha/ Hyderabad
12. The Chief Engineer/P&MM/TSTRANSCO/Vidyut Soudha/ Hyderabad
13. The Chief Engineer/Comml/TSPCC/TSTRANSCO/Vidyut Soudha/ Hyderabad
14. The Chief Engineer/RAC/TSTRANSCO/Vidyut Soudha/ Hyderabad
15. The Chief Engineer/Civil/TSTRANSCO/Vidyut Soudha/ Hyderabad
16. All the Superintending Engineer (OMC)s…….
17. The SE(Tech) to the Chairman and Managing Director/TSTRANSCO/VS/Hyderabad
18. PS to the Joint Managing Director(Fin., Comml & HRD) /TSTRANSCO/VS/Hyderabad
19. DE(Tech) to the Director(Transmission)/ TSTRANSCO/VS/Hyderabad
20. DE(Tech) to the Director(Projects)/TSTRANSCO/VS/Hyderabad
21. ADE(Tech) to the Director (LIS)/TSTRANSCO/VS/Hyderabad
22. PS to the Director(Grid operations)/TSTRANSCO/VS/Hyderabad
23. Stock file

//Forwarded By Order//

//Assistant Divisional Engineer (TOT-I)//

ANNEXURE-I

MODULE - I (For O&M Staff, Substation Operators and Special Maintenance Gang working in EHT Substations)

TRAINING PROGRAMME(TS-SMART) ON EHT SUBSTATIONS: MAINTENANCE AND SAFETY

Date	Days	FN / AN	PART- I: OVERVIEW OF POWER SECTOR
	Day1	FN	Over view of TSTRANSCO and Roles and Reponsibilities of O&M Staff
		AN	**Basics of Electricity:** What is Electricity, Eelectricity Generation , Transmission, Distribution-Scope of Genco, Transco, Discoms, Substations, Current, Voltage, Power-Active Power, Reactive Power, Powerfactor, Horse Power, Watts, Units, Frequency, Single Phase, Three Phase, Grid, Load Dispatch Centre, EHT, HT, LT, etc. Basic Understanding of Electricity Act-2003.
			PART - II: O&M OF EHT SUBSTATIONS
	Day2	FN	**INTRODUCTION TO SUBSTAION-EQUIPMENT-FUNCTIONS:** Types of substations - 400KV, 220KV, 132KV, switching station, GIS SS, AIS SS, Hybrid SS, SAS SS. switchyard - Equipment, structures & functions, Bus Bar Arrangement, metal spreading, Bay kiosks. Control Room - Control and Relay panels, Batteries, PLCC, Fire fighting arrangement, Earting arrangement, substation / yard lighting, substation layouts & single line diagram. Registers to noted
		AN	**Shift operations of EHT substations:** Shift hnading over procedures,Conventional and automated substations, Battery and Battery charger observations- procedure for taking daily and monthly readings of battery, Healthiness,Major things to monitor on PTR, Lightning Arrester, Healthiness of LA, Current Transformer Observations, Hot Spots, Capacitor Voltage Transformer(CVT) & Potential Transformer Observations, Capacitor Bank, Fire Fighting Equipment - HVSW for fire Protection, N2 injection to quench the arc,DG set, 33KV feeder bay, Isolator handle,isolator locking,Earth pit,400KV Equipment, 400KV Isolator types, Observations.
	Day3	FN	**SubStation Maintenance:** Types of Maintenance- General, Preventive & Breakdown Maintenance.Lock out Limits of Air and SF6 gas Pressures and precautions to be taken,basics of Gas filling equipment in AIR. Preventive Maintenance: PTR, Current Transformer-Types of CT, CTMB, Circuit Breaker-Compressor Breaker Mechanism, Isolator-Isolator motor operated mechanism box, Capacitor Voltage Transformer(CVT) & Potential Transformer, Battery & Battery Charger, Capacitor Bank, DG set and Station Transformer. Earthing to be arranged at LA for Line LC through surge monitor, Power Cable feeders Earthing, 33Kv feeder Bay, Earth Switch, Clamps & Connectors, tightening of Jumper Clamps & colour coding of Phases.
		AN	**LC Procedures:** Precautions and Procedures for issue of Line Clear, NBFC. Precautions after LC returned to be incorporated along with LC issuing LC issues on request over phones. LC issues to DISCOMs. **On-site Energency Management:** How to handle the Substation during untoward incidents and restore the system without any damage. Case studies.Contigency planing in case of incomming supply failure,PTR pullouts andd 33kV feeder Multiple breakdowns.
	Day4	FN	**Basics of MRT aspects RELATED TO O&M OF SUB-STATIONS:** 1. Control & Relay panels 2. Checking of all trip circuit healthiness & Importance 3. Feeder trip analysis, noting the relay indications and Feeder test charge 4. Control cables ,laying and termination,Wiring of control & Relay panels, CB wirings and about J1, J2 & K1, K2 notations 5. Replacement of Trip coils & closing coils of CB's. 6. Mechanical/Electrical knowledge about CB's 7.Explanation on PTRs, PTR temperatures, Cooling fans auto ON/OFF 8. AC/DC Supply to Protective equipment and feeders
		AN	**SLDC:** 1. SLDC, Introduction & its Function. 2. Awareness to the operator to know about their Substation Information. 3. Importance of Load Generation & its Balance. 4. Important Equipments in Substation. 5. Understanding of Relays & its nomenclature. 6. Appropriate time to Communicating to SLDC for obtain LC etc. 7. Procedure for Prearranged Shutdown & Emergency Shutdown. 8. Voltage Monitoring & control by operating OLTC & Capacitor Bank.

	Day5	FN / AN	**Field Visit to** concerned Substation to sudy on Maintenance aspects and LC Procedures in Substations upto 400kV covered in maintenance classes(Day 2, 3 & 4): 1.09:30 AM to 11:00 AM -Substation-Equipment-Functions 2.11:30AM to 12:45PM -LC Procedures. 3.02:00PM to 03:30PM- MRT - Demonstration of C&R pannels, Relays, Ferrols(J1,J2 etc.,) 4.03:45 PM to 05:00 PM-Disaster Management
PART-III: BASIC OF EHT LINES & MAINTENANCE			
	Day6	FN	**Transmission Lines:** **Foundations: Basic terms-Footing, Chimney, Stub, Coping, Cleat etc.,, Tower:** Basic Structure of Tower, Tower Accesories-Number plates, phase plates,danger boards, step boards, anti climbing devises, bird gurads, Earth Wire/OPGW, Earthing. **Type of Towers:** 132KV, 220KV & 400kV Towers, Suspension, Tension, Dead end, Anchor etc.,, **Type of conductors-** Zebra,Moose,Drake-ACCC(Aluminium Conductor Carbon core)(HTLC) etc., **Line Equipment:** Insulators-Identification of Towers, Silicon Rubber Insulators, Arcing Horns-cut point, Vibration dampers, Clamps- PG clamps, Suspension clamps, Connectors, **Suspension hardware:** old, new, single suspension, double suspension, for twin moose suspension hardware, Bird guards, Mid span joints and Repair Sleevs. **Patrolling**- Norms for patrolling Lines,Types,Safety precautions to be taken, Thermovision Scanning. Break Down-Types. **Important Maintenance Issues:**
PART-IV: ELECTRICAL AND FIRE ACCIDENTS, SAFETY AND FIRST AID			
	Day6	AN	**ELECTRICAL HAZARDS AND OPERATIONAL SAFETY IN TRANSMISSION:** 1. Electricity and its hazards 2. Effects of electrical hazards 3. How to minimize electrical hazards 4. Causes of deaths in electrical accidents 5. Case studies 6. Safety aspects in Transmission 7. Safety tools-Electrical safety work practices. 8. Safety precautions to be followed at workplace. 9. Accidents, causes & Prevention. 10. STATIC ELECTRICITY.
	Day7	FN	**FIRST AID DURING ELECTRICAL SHOCK AND INJURIES & FIRE SAFETY:** 1. Different types of electrical injuries 2. High voltage electrical injuries 3. First aid & Safety 4. Fire, Stages of fire, fire spreading, classification of fire, causes of fire, fire extinguishers, case studies etc.
		AN	Mock Drill & Field Demonstration on Electrical Fire Safety & First Aid
PART-V: PERFORMANCE EVALUATION AND FEEDBACK			
	Day8	FN1	Transformer Oil sample collection procedures
		FN2	COVID-19 Awareness Program: Dr. P. Sridhar Reddy, Cardiologiest, Appollo Hospitals, Jubleehills
		AN	Exam and Participants Feedback Closing Session

ANNEXURE-II

MODULE - II (For O&M staff and Artisans of Central Break Down-CBD Gang Working in EHT Lines)

TRAINING PROGRAMME(TS-SMART) ON EHT LINES: MAINTENANCE AND SAFETY

Date	Days	Session	PART- I: OVERVIEW OF POWER SECTOR
	Day 1	FN	Over view of TSTRANSCO and Roles and Reponsibilities of O&M Staff (CBD lines staff)
		AN	**BASICS OF ELECTRICITY:** What is Electricity, Eelectricity Generation , Transmission, Distribution-Scope of Genco, Transco, Discoms, Substations, Current, Voltage, Power-Active Power, Reactive Power, Powerfactor, Horse Power, Watts, Units, Frequency, Single Phase, Three Phase, Grid, Load Dispatch Centre, EHT, HT, LT, etc. Basic Understanding of Electricity Act-2003.
	Day 2	FN	**Transmission Lines:** **Foundations:** Basic terms-Footing, Chimney, Stub, Coping, Cleat etc., Tower: Basic Structure of Tower, Tower Accesories-Number plates, phase plates,danger boards, step boards, anti climbing devises, bird gurads, Earth Wire/OPGW, Earthing. **Type of Towers:** 132KV, 220KV & 400kV Towers, Suspension, Tension, Dead end, Anchor etc., Type of conductors-Zebra, Moose, Drake-ACCC (Aluminium Conductor Carbon core) (HTLC) etc., Transmission Line Clearances, Line Equipment: Insulators-Identification of Towers, Silicon Rubber Insulators, Arcing Horns-cut point, Vibration dampers, Clamps- PG clamps, Suspension clamps, Connectors, Suspension hardware: old, new, single suspension, double suspension, for twin moose suspension hardware, Bird guards, Mid span joints and Repair Sleevs, Insulator hoisting, stringing of conductor, and earth wire, Clipping and Jumpering. **Substation:** Substaion equipement and its functions.
		AN	**EHT LINE MAINTENANCE:** Aim of EHV Line Maintenance, Tower Anatomy Patrolling-Types,Safety precautions to be taken, Items to carry before starting of patrolling. Checking of following during Patrolling: Foundations, legs, Tree cutting, Bush clearance, Insulators-Silicon Rubber Insulators, Arcing Horns-cut point, Vibration dampers, Clamps- PG clamps, Suspension clamps, Connectors, Suspension hardware- old, new, single suspension, double suspension, for twin moose suspension hardware, Bird guards, Mid span joints, Tension Hardware-single, double, Jumpers, Conductors-Types, Earth wire- Earth bonds, Railway Crossing lines. Thermovision Scanning. Break Down-Types. Precautions to be taken while climbing or working on towers.
	Day 3	FN	**MAINTENANCE OF T&P TOOLS:** Maintanance of T&P tools, operations and its healthyness such as lifty, compressor, turn buckle, leg winch, pullys (open and close type), steel rope, Manila rope,PP ropes, Come along clamps etc., **CASE STUDIES** : Attending of various types of breakdowns such as River breakdowns, Twisted towers, Cascading collapse of towers, Lifting of foundations, Deformation of towers due to collision of vehicles, Falling of earth wire/OPGW on power conductor, Submergible towers etc.,
		AN	**FIELD VISIT:** Line patrolling.
	Day 4	FN	**ELECTRICAL HAZARDS AND OPERATIONAL SAFETY ON TRANSMISSION LINES:** 1. Electricity and its hazards 2. Effects of electrical hazards 3. How to minimize electrical hazards 4. Causes of deaths in electrical accidents 5. Case studies 6. Safety aspects on Transmission lines. 7. Safety tools-Electrical safety work practices. 8. Safety precautions to be followed at workplace. 9. Accidents, causes & Prevention. 10. Static Electrictrity.
		AN	**FIRST AID DURING ELECTRICAL SHOCK AND INJURIES & FIRE SAFETY:** 1. Different types of electrical injuries 2. High voltage electrical injuries 3. First aid & Safety 4. Fire, Stages of fire, fire spreading, classification of fire, causes of fire, fire extinguishers, case studies etc.
	Day 5	FN	Mock Drill & Field Demonstration on Electrical Fire Safety & First Aid
		AN	Exam and Participants Feedback Closing Session

ANNEXURE-III

Allocation of Budget to the OMC circles to meet expenditure of On line live training program on "Transmission System:Safety, Maintenance and Restoration Techniques(TS-SMART)"			
S.No.	**Pay Unit Code**	**Pay Unit**	**Amount sanctioned in Rs**
1	3300	SE/OMC/Metro West	Rs.50,000.00 (Rupees Fifty Thousand Only)
2	3310	SE/OMC/Metro/East	Rs.50,000.00 (Rupees Fifty Thousand Only)
3	5101	SE / OMC / Warangal	Rs.50,000.00 (Rupees Fifty Thousand Only)
4	5102	SE/OMC/ Sangareddy	Rs.50,000.00 (Rupees Fifty Thousand Only)
5	5106	SE/OMC/Nizamabad	Rs.50,000.00 (Rupees Fifty Thousand Only)
6	5108	SE/OMC/Metro/Central	Rs.50,000.00 (Rupees Fifty Thousand Only)
7	5111	SE/OMC/Karimnagar	Rs.50,000.00 (Rupees Fifty Thousand Only)
8	5112	SE/OMC/Nalgonda	Rs.50,000.00 (Rupees Fifty Thousand Only)
9	5113	SE/OMC/Mahabubnagar	Rs.50,000.00 (Rupees Fifty Thousand Only)
10	5121	SE/OMC/Khammam	Rs.50,000.00 (Rupees Fifty Thousand Only)
11	5122	SE/OMC/Adilabad	Rs.50,000.00 (Rupees Fifty Thousand Only)

ANNEXURE-IV

TRAINING PROGRAMME(TS-SMART) ON EHT SUBSTATIONS: MAINTENANCE AND SAFETY

Nomination of participants (O&M Staff, Substation Operators and Special Maintenance Gang working in EHT Substations)

ZONE:.....

BATCH No.....(Total 5 batches)

S. No	Name of the Circle	Name of the Participant	Designation	WhatsApp No of the participant	Name of the Substation	Name of the Coordinator/Designation [at least one(1) for every 10 Participants]	WhatsApp No. of the Coordinator	Name of the Mentor/ Designation/ whatsap no [one(1) from each circle]	Name of the Zonal Coordinator/ Whats app No	Name of the Coordinator /Telecom/desination/Whats app no [One(1)from each zone]	Designated Substation where participant is attending online Training program

ANNEXURE-V

TRAINING PROGRAMME(TS-SMART) ON EHT LINES: MAINTENANCE AND SAFETY

Nomination of participants (O&M staff and Artisans of Central Break Down-CBD Gang Working in EHT Lines)

ZONE:.....

BATCH No: .... [Total (2) batches]

S. No	Name of the Circle	Name of the Participant	Designation	WhatsApp No of the participant	Name of the Coordinator/Designation [at least one(1) for every 10 Participants]	WhatsApp No. of the Coordinator	Name of the Mentor/ Designation/ whatsap no [one(1) from each circle]	Name of the Zonal Coordinator/ Whats app No	Name of the Coordinator /Telecom/desination/Whats app no [One(1)from each zone]	Designated Substation where participant is attending online Training program