Skill India
कौशल भारत-कुशल भारत

Directorate General of Training

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

CERTIFICATE COURSE ON

Railway Electrical - TRD

NSQF LEVEL- 4

SECTOR – POWER

Railway Electrical - TRD

Duration: 240 Hours

NSQF LEVEL- 4

(Version: 1.0)

Designed in 2026

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

&

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

EN-81, Sector-V, Salt Lake City,

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1. COURSE INFORMATION

1.1 GENERAL

This course has been developed for CTS/CITS trainees to take up as optional courses during course of study for technical and behavioural upgradation of trainees to meet industry related job roles. During the 240 hours duration of Railway Electrical - TRD (Traction Distribution) course, a candidate is trained on professional skills & knowledge related to job role. The Broad components covered during the course are given below:

After completing this course, trainees will be able to understand the organizational structure of Indian Railways and the fundamentals of Railway Electrical - TRD power supply systems. They will gain hands-on skills in installing, operating, and inspecting railway power supply installations, including substations and Overhead Equipment (OHE), while following standard safety rules. Trainees will be able to work with advanced traction systems such as the 2 × 25 KV AC system and use SCADA for monitoring and control. They will also be capable of applying energy conservation measures and effectively handling electrical breakdowns and emergency situations.

1.2 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of 6 weeks: -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	180
2.	Professional Knowledge (Trade Theory)	60
	Total	**240**

1.3 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through assessment at the end of the course through skill testing at Training Center & CBT through examination conducted by DGT.

The minimum pass percentage for skill test is 60% and for theory will be 33% as in main CTS examination.

2. JOB ROLE

Brief description of Job roles:

Electrical Technicians, Other; include all other Electrical Technicians engaged in research and testing in various fields of electrical engineering, not elsewhere classified.

Reference NCO-2015:

i) 3113.9900- Electrical Technicians, Other

3. GENERAL INFORMATION

Name of the Trade	**RAILWAY ELECTRICAL – TRD (Traction Distribution)**
Reference NCO – 2015	3113.9900
NSQF Level	4
Duration of Craftsmen Training	240 Hours
Entry Qualification	10th Class passed and pursuing/ passed out Electrician under CTS/ CITS Candidates
Unit Strength (No. of Student), Space & Power Norms	Same as Electrician under CTS / CITS.
Instructors Qualification	B.Voc/Degree in Electrical/ Electrical and Electronics Engineering from AICTE/UGC recognized Engineering College/ university with one-year experience in the relevant field. **OR** 03 years Diploma in Electrical/ Electrical and Electronics Engineering from AICTE/recognized board of technical education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. **OR** NTC/NAC passed in the trade of "Electrician" with three years' experience in the relevant field. **Essential Qualification:** Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) under DGT.
List of Tools and Equipment	As per Annexure – I

4. LEARNING OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

4.1 LEARNING OUTCOMES

1. Explain the organizational structure of Indian Railways and describe the fundamentals of the Railway Electrical - TRD power supply system.
2. Identify and demonstrate the components and functioning of Railway Power Supply Installations, including substations and associated equipment.
3. Perform installation of basic Overhead Equipment (OHE) in accordance with standard railway specifications and safety practices.
4. Apply general electrical and railway safety rules and demonstrate safe working practices during installation and maintenance activities.
5. Execute and inspect general Overhead Equipment works as per prescribed procedures.
6. Analyze and demonstrate advanced Railway Power Supply Installations, including energy conservation measures, protection and safety.
7. Demonstrate the working principles of the 2 × 25 kV AC traction system used in Indian Railways.
8. Describe and operate Remote Control and SCADA systems used for monitoring and controlling railway power supply networks.
9. Identify, analyze, and respond to electrical breakdowns and accidents by applying standard troubleshooting methods and emergency procedures.

5. SYLLABUS

SYLLABUS – RAILWAY ELECTRICAL - TRD			
Duration: 240 Hours			
Duration Weeks	**Reference Learning outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
Professional skills 10 Hrs. Professional Knowledge 05 Hrs.	Explain the organizational structure of Indian Railways and describe the fundamentals of the Railway Electrical - TRD power supply system.	1. Power supply Arrangement for Railway Traction Distribution	• Brief Introduction about Indian Railways • Brief Introduction of Indian Railway Working • Brief Introduction to Indian Railway Electrical - TRD Department • Brief Introduction to Indian Power System
Professional skills 20 Hrs. Professional Knowledge 10 Hrs.	Identify and demonstrate the components and functioning of Railway Power Supply Installations, including substations and associated equipment.	**Demonstrate and use of -** 2. Traction Power Transformers 3. Auxiliary Transformer 4. Current Transformer 5. Potential Transformer 6. Lightning Arrestor 7. Bonding and Earthing 8. Batteries and Battery chargers	• Duty of Technician. (PSI) • Circuit breaker, Interrupter and Isolator • Capacitor Bank • Numbering Scheme in PSI • Battery maintenance of switching station
Professional skills 35 Hrs. Professional Knowledge 10 Hrs.	Perform installation of basic Overhead Equipment (OHE) in accordance with standard railway specifications and safety practices.	**Perform installation of -** 9. Cantilever assembly 10. Regulating Equipment 11. Section Insulator 12. Isolators 13. Droppers 14. Tension length 15. Overlap 16. Jumpers 17. Contact wire height 18. Stagger 19. Span Length 20. Implantation/Setting Distance 21. Turnout and Crossover 22. Bonding and Earthing	• General overview of OHE • Duty of Technician (OHE) • Foundation for OHE Structures • OHE Structure • Neutral Section • Conductors • Encumbrance • Clearances • Principles of sectioning & Numbering Scheme • Operation of Isolator
Professional skills 20 Hrs.	Apply general electrical and railway safety rules and	23. Induction effects of 25kV ac 50Hz Single Phase Traction	• General Safety rules, PPEs • Electrical safety and IE

Professional Knowledge 10 Hrs.	demonstrate safe working practices during installation and maintenance activities.	24. T&P for OHE & PSI	Rules • Safety rules for OHE • Familiarization of various mechanical & Electrical T&P used for TRD
Professional skills 25 Hrs. Professional Knowledge 05 Hrs.	Execute and inspect general Overhead Equipment works as per prescribed procedures.	25. Tower wagon operation, maintenance and safety while working 26. Use of Power blocks and P1W 27. Perform Current collection test (OLIVER-G)	• Maintenance schedule for overhead equipment
Professional skills 25 Hrs. Professional Knowledge 05 Hrs.	Analyze and demonstrate advanced Railway Power Supply Installations, including energy conservation measures, protection and safety.	28. Perform Energy conservation measures for Traction installations 29. Safety during working at power supply installations 30. Uses of Thermo- Vision Camera and other conditioning monitoring testing for PSI Equipment.	• Introduction to Relays and protection system for PSI • Maintenance Schedule for power supply installations • Condition monitoring Testing
Professional skills 10 Hrs. Professional Knowledge 05 Hrs.	Demonstrate the working principles of the 2 × 25 kV AC traction system used in Indian Railways.	31. Demonstrate 2X25kV AC Traction System	• Introduction to 2X25kV AC Traction System. • Case Studies, Doubt Clarifications & Group Discussions
Professional skills 10 Hrs. Professional Knowledge 05 Hrs.	Describe and operate Remote Control and SCADA systems used for monitoring and controlling railway power supply networks.	32. Demonstrate Duty of Technician (RC) 33. Use various features of SCADA in railway system.	• Introduction to SCADA in railway system
Professional skills 25 Hrs. Professional Knowledge 05 Hrs.	Identify, analyze, and respond to electrical breakdowns and accidents by applying standard troubleshooting methods and emergency procedures.	34. Demonstrate Sub-station and switching station breakdown 35. Demonstrate Breakdown of RC equipment 36. Find out OHE breakdown and its troubleshoot. 37. Ascertain Electrical accidents 38. Use of Emergency stores and breakdown equipment	• Introduction to traction sub -station (TSS)

6. ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENTCRITERIA
1. Explain the organizational structure of Indian Railways and describe the fundamentals of the Railway Electrical - TRD power supply system.	Demonstrate Power supply Arrangement for Railway Traction Distribution
2. Identify and demonstrate the components and functioning of Railway Power Supply Installations, including substations and associated equipment.	Use of Traction Power Transformers and its operation
	Identify and use of Auxiliary Transformer, Current Transformer, Potential Transformer etc.
	Use of Lightning Arrestor, Bonding and Earthing
	Perform and apply Batteries and Battery chargers
3. Perform installation of basic Overhead Equipment (OHE) in accordance with standard railway specifications and safety practices.	Assemble Cantilever and its use.
	Use of Regulating Equipment, Section Insulator.
	Implantation/Setting Distance as per norms
	Demonstrate Turnout and Crossover
	Perform and test Bonding and Earthing
4. Apply general electrical and railway safety rules and demonstrate safe working practices during installation and maintenance activities.	Induction effects of 25kV ac 50Hz Single Phase Traction T&P for OHE & PSI
5. Execute and inspect general Overhead Equipment works as per prescribed procedures.	Tower wagon operation, maintenance and safety while working
	Use of Power blocks and P1W
	Perform Current collection test (OLIVER-G)
6. Analyze and demonstrate advanced Railway Power Supply Installations, including energy conservation measures, protection and safety.	Perform Energy conservation measures for Traction installations
	Safety during working at power supply installations
	Uses of Thermo- Vision Camera and other conditioning monitoring testing for PSI Equipment.
	Perform Energy conservation measures for Traction installations
7. Demonstrate the working principles of the 2 × 25 kV AC traction system used in Indian Railways.	Demonstrate 2X25kV AC Traction System

8. Describe and operate Remote Control and SCADA systems used for monitoring and controlling railway power supply networks.	Demonstrate Duty of Technician (RC)
	Use various features of SCADA in railway system.
9. Identify, analyze, and respond to electrical breakdowns and accidents by applying standard troubleshooting methods and emergency procedures.	Demonstrate Sub-station and switching station breakdown
	Demonstrate Breakdown of RC equipment
	Find out OHE breakdown and its troubleshoot.
	Ascertain Electrical accidents
	Use of Emergency stores and breakdown equipment

ANNEXURE-I

LIST OF TOOLS & EQUIPMENT			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
Same as Electrician under CTS/ CITS.			
Additional Tools & Equipment required			
1.	Tirfor	0.75 Ton	1 No.
2.	Tirfor	1.5 Ton	1 No.
3.	Tirfor	3 Ton	1 No.
4.	Pull - Lify	0.75 Ton	1 No.
5.	Pull - Lift	1.5 Ton	1 No.
6.	Pull - Lift	3 Ton	1 No.
7.	Dropper Making Jig and Wire Straightener	for 5 mm dropper wire	1 No.
8.	Come —along clamp for catenary wire suitable	for 19/2.108mm conductor	1 No.
9.	Come —along clamp	for contact wire 107 Sq mm	1 No.
10.	Come —along clamp for Earth Wire suitable	for 19/2.5mm Galvanized Steel	1 No.
11.	Rail Jumpers with clamp both ends		1 No.
12.	Rail Jumpers extension with clamp one end		1 No.
13.	Ear thing discharge Rod Complete		1 No.
14.	Aluminum ladder	8 m with hook on top	1 No.
15.	Drilling machine	25 mm motor driven	1 No.
16.	First aid box		1 No.
17.	Contact wire cutter	36”	1 No.
18.	Dropper wire Cutter	12”	1 No.
19.	Contact wire twist —cum-bender 6”		1 No.
20.	D-shackles set of one each	1”, 3/4”, 5/8”, 1/2”	1 No.
21.	Single sleeve pulley block 3-1/2” x / Groove steel		1 No.
22.	Contact wire splicing Jig	107 Sq mm	1 No.
23.	Steel sling with eye each end	19 mm dia	1 No.
	a) 1 m long		1 No.
	b) 2 m long		1 No.
	c) 3 m long		1 No.

	d) 4 m long		1 No.
	e) 10 m long		1 No.
24.	Copper Hammer	2 Kg	1 No.
25.	Digital Micrometer		1 No.
26.	Bench vice	6”	1 No.
27.	Engineering Ratchet		1 Set
28.	Megger	2500 V	1 No.
29.	Earth Tester		1 No.
30.	Binocular		1 No.
31.	Vernier calipers		1 No.
32.	Multi meter		1 No.
33.	Crimping tool	up to 6 sq mm size	1 No.
34.	Drop out fuse pull rod /D. 0. Rod		1 No.
35.	Acidity Testing Kit		1 No.
36.	BDV oil Testing machine		1 No.
37.	Tong Tester	0-SA / 25 A	1 No.
38.	Black Smith Hammer	12 kg	1 No.
39.	Insulator testing Jig Hydraulic type		1 No.
40.	Kink Remover		1 No.
41.	Bond press twister		1 No.
42.	Ring spanner set	12 to 32	1 Set
43.	DE spanner set (12 to 32)	12 to 32	1 Set
44.	Screw Driver	6” to 18”	1 Set
45.	Insulated cutting plier	8” & 12”	1 Set
46.	Pipe Wrench	8” & 12”	1 No.
47.	Plumb-bob		1 No.
48.	Hexa frame with blade	12”	1 No.
49.	Spirit level	6” & 12”	1 No.
50.	Allen key	2 X 10 mm	1 No.
51.	Hand signal flags	Red & Green	1 No.
52.	Hydrometer		1 No.
53.	Thermometer		1 No.
54.	Pick axe		1 No.
55.	Dynamometer	0-5 ton	1 No.
56.	Digital spring balance for balance weight movement checking		1 No.
57.	Hydraulic ATO pulley bearing puller		1 Set
58.	Hand glows	for 25 KV	1 No.
59.	Chisel		1 No.

60.	Grinder		1 Set
61.	Measuring Tapes and steel rules		1 No.
62.	Cable fault locator /Route Tracers		1 No.

ANNEXURE-II

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in designing/ revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of members attended the Trade Committee Meeting for designing of Railway Electrical - TRD syllabus under Short Term Courses held on 24th December, 2025 at IRICEN, Pune.

Sl. No.	Name and Designation (Shri/Smt./Kumari)	Organization with Address	Remarks
1.	Rajeev Kumar Sinha, ADG/IRICEN	IRICEN, Pune	Chairman
2.	T. Ragulan, Director	CSTARI, Kolkata	Member
3.	Shrirang Kamble, SR.PROF.(BRIDGE)	IRICEN, Pune	Member
4.	Hari Ram, SR.PROF.TRD	IRIEEN, Nashik	Member
5.	Akhilesh Pandey, Asst. Director	CSTARI, Kolkata	Member
6.	J.M Patekari, Asst. Professor	IRICEN	Member
7.	Janardan Pracad, Asst. Professor	IRICEN	Member
8.	R.K. Pandey, Sr. Instructor	IRIEEN, Nashik	Member
9.	Dhumal Sachin Manikrao, Deputy Director	DVET, Regional Office, Pune	Member
10.	Indiresh Rangrao Bhilegaonkar, Principal	Govt. I.T.I. Aundh (Women)Pune	Member
11.	Ubale Kishor Sodamrag, Inspector	Regional Office Pune	Member
12.	Chavan Sunil Vasant, Craft Instructor Electrician	ITI Aundh Pune	Member
13.	Pawar Santosh Tulshiram, Craft Instructor (Welder)	Govt. I.T.I. Aundh, Pune-67	Member
14.	Pawale Hanumant Battatray, Craft Instructor -Ctok-Fitter	Govt. I.T.I. Aundh, Pune	Member
15.	Pankaj Nimba Bhamake, Craft Instructor Electrician	GOVT.I.T.I. Nashik	Member
16.	Chabukcwar Tukaram Prabhakar, Craft Instructor Electrician	GOVT.I.T.I. Nashik	Member
17.	Jitendra J. Sambare, Craft Instructor	Govt. Industrial Training Institute Sinnar, Nashik	Member

18.	Nitesh Ananda Patil, Training Officer	NSTI MUMBAI	Member
19.	Dipak Dagadu Patil, Deputy Manager (Quality)	M/S- Hind Rectifiers Limited, Nashik	Member
20.	Telangi Mohan Kankanna, Vice Principle	Govt. ITI Nashik	Member
21.	Dilip Vishnu Adhav, Plant Head	Lucy Electric India Pvt. Ltd. Ahmedabad Nashik	Member