

INDUSTRIAL TRAINING INSTITUTE

CRAFTSMEN TRAINING SCHEME (CTS)

ANNUAL INSTRUCTIONAL PLAN BREAKUP (42 WEEKS) WIREMAN - SECOND YEAR

(Curriculum as per DGT / CSTARI Guidelines for Wireman CTS Scheme - 2nd Year)

Trade Name & Code	WIREMAN (Engineering Trade) - CTS Version 3.0
NSQF Level & Duration	NSQF Level-3 Two Years (Second Year - 42 Weeks)
Academic Session	
Instructor Name & Designation	
Group Instructor (GI) Name	
Principal / Superintendent Name	
Institute Name & Address	

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 1	- Practice wiring for communication circuits and computer networks using UTP, STP, Co-axial and optical fibre cables. - Practice terminating network cables using RJ-45 connectors and test continuity using LAN tester.	- Commercial Wiring: Special precautions in commercial buildings as per I.E. rules. - Types of wiring: Power, control, communication and entertainment wiring. - Specifications and installation procedures of UTP, STP, Coaxial and Optical fibre cables.
Week 2	- Wire up lighting system for control using motion detector sensor. - Wire up panel board for control of lights and fans using wireless remote control switch.	- Motion sensors: Operating principles, PIR sensors, detection angles and wiring diagrams. - Remote control switching systems for lights and fan speed control. - Energy conservation techniques in commercial lighting installations.
Week 3	- Demonstrate wiring and components of fire alarm systems, smoke detectors, heat detectors, sirens, control & signalling panels using visual aids. - Connect and test smoke detectors and alarm sounders.	- Fire alarm systems: Types (conventional and addressable), control panels, detectors and call points. - Wiring circuits planning and cabling standards in healthcare and commercial facilities. - Life safety codes, routing to minimize interference with medical and critical equipment.
Week 4	- Practice installation and connection of 1-Phase and 3-Phase online/offline UPS wiring and testing. - Connect battery bank to UPS and verify backup duration and load switching.	- Uninterruptible Power Supply (UPS): Online vs Offline UPS, working principles and block diagrams. - Ground-fault circuit interrupter (GFCI) receptacles and protection standards. - Grounding and shielding requirements for sensitive UPS loads.
Week 5	- Install, mount and wire up CCTV camera system (bullet and dome cameras) with DVR/NVR. - Install domestic inverter and carry out input/output wiring with battery connections.	- Closed Circuit Television (CCTV): Cameras, DVR/NVR connections, BNC/DC couplers and cabling. - Inverter circuits, battery charging characteristics, inverter capacity selection and load calculation. - Changeover switches and earthing of inverter systems.
Week 6	- Demonstrate wiring plan, lighting fixtures, IP-rated receptacles and sensors for bathing areas. - Demonstrate multi-storeyed building wiring and distribution rising mains. - Install temporary LV electrical panels and lighting arrangements for construction sites.	- Electrical safety zones and wiring guidelines for bathing areas and wet locations. - Multi-storeyed building electrification: Rising mains, bus trunking, sub-distribution boards. - Construction site temporary wiring: Safety measures, IP rating protection, and earth fault protection.
Week 7	- Identify accessories and tools required for industrial wiring. - Demonstrate various industrial switchboards, switchgears, industrial control panels and accessories. - Demonstrate cable trays, raceways, hangers, auxiliary gutters, cable bus assemblies, and trenches.	- Industrial Wiring: Environmental and mechanical conditions affecting industrial installations. - Degree of mechanical and electrical protection necessary in factories and plants. - Cable tray systems, raceways, auxiliary gutters, and cable bus assemblies as per IE rules.
Week 8	- Determine minimum ampacity and conductor size for continuous and non-continuous industrial loads. - Practice installing industrial cables in conduits as per IE rules. - Practice cutting, threading, and bending of metallic conduits.	- Conductor sizing: Ampacity tables, de-rating factors, continuous and non-continuous loads. - Metallic conduit wiring: Types, accessories, bending techniques, threading and joining methods. - Lighting power density and lighting design principles for industrial shop floors.
Week 9	- Identify different bus bars (Copper & Aluminum), practice joining and installation of overhead bus bar systems as per IE rules. - Prepare bill of material, plan and practice wiring of an industrial workshop as per IE rules.	- Bus bar systems: Current carrying capacities, expansion joints, supports, and clearances. - Preparation of bill of materials, load estimation, and costing for workshop wiring. - Statutory safety provisions and danger notices as per Indian Electricity (IE) rules.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 10	• Demonstrate Hospital wiring, Tunnel wiring, and Godown wiring circuits using visual aids. • Practice testing, fault detection, and tracing in industrial wiring installations.	1. Special wiring circuits: Working principle and diagrams of Godown, Tunnel, and Corridor wiring. 2. Special electrical requirements for hospital operating rooms and intensive care units. 3. Industrial wiring testing procedures: Insulation resistance, loop impedance, and fault clearance.
Week 11	• Practice laying cables in cable trays, raceways, and underground trenches. • Demonstrate various cable glands (brass, compression, explosion proof) and practice cable glanding on switch cabinets.	1. Cable Management: Selection of cables, laying methods in trenches, trays, and ducts. 2. Cable glands: Types, sizes, fitting procedures, and IP rating standards. 3. Ingress Protection (IP) ratings and code format definitions.
Week 12	• Practice cable entry through cable entry plate for cables without connectors (up to IP68 rating). • Practice split cable entry for multiple pre-terminated cables (up to IP65 rating). • Demonstrate bonding and grounding of raceways, cable assemblies, panels, and use of earth rods.	1. High IP-rated cable entry systems (IP65, IP68) and sealing techniques. 2. Importance of bonding and grounding in raceways, metallic conduits, and panels. 3. Cable fault locating techniques: Blavier test, Murray loop test, and open/short circuit tests.
Week 13	• Group different wattage lamps in series/parallel for specified illumination and voltage. • Practice on low-voltage track lighting, mains voltage track lighting, and LED battery-powered lights. • Prepare decorative lamp circuits to produce rotating and running light effects.	1. Illumination: Laws of illumination (Inverse square law, Lambert's cosine law). 2. Types of lighting schemes: Direct, indirect, semi-direct, and decorative lighting. 3. Track lighting systems and decorative flasher/chaser circuits.
Week 14	• Install display spotlights, LED downlights, and fluorescent luminaires. • Demonstrate kitchen under-cabinet lighting, shelf lighting, closet lighting, weatherproof lighting, and cove lighting. • Practice installation of HP mercury vapour, LP mercury vapour, HP sodium vapour, LP sodium vapour, and metal halide lamps.	1. Light sources: Construction and operation of HPMV, HPSV, LPSV, and Metal Halide lamps. 2. Luminous efficacy, color rendering index (CRI), lumens calculation, and beam angles. 3. Reflectors: PAR (Parabolic aluminized reflector) and MR (Multi-faceted reflector) luminaires.
Week 15	• Assemble, program, and operate PAR lights using DMX controller for stage and studio lighting control. • Visual demonstration of LED video wall panel installation, hardware connections, and software setup.	1. DMX 512 protocol: Channel assignments, addressing, and DMX controller operations. 2. Stage and studio lighting controls: Dimming, scene setting, and color mixing. 3. LED video wall panels: Module construction, hardware interfacing, and controller software.
Week 16	• Determine resistance values using 4-band and 5-band color codes and verify with multimeter. • Plot forward and reverse V-I characteristics of semiconductor P-N junction diodes. • Identify terminals and test active/passive electronic components (diode, transistor, capacitor, voltage regulator).	1. Resistor color coding, types of resistors, wattage ratings, and tolerances. 2. Semiconductor physics: P-N junction diode, forward and reverse biasing, characteristics. 3. Active and passive electronic components: Capacitors, BJTs, and three-terminal voltage regulators.
Week 17	• Construct and test Half-Wave, Full-Wave center-tapped, and Bridge rectifier circuits with capacitor filters. • Assemble DC regulated power supply unit and practice soldering on PCB.	1. Rectifier circuits: Half wave, full wave center-tapped, and bridge rectifiers. 2. Ripple factor, rectification efficiency, and PIV rating of diodes. 3. Smoothing filter circuits (C, LC, and Pi filters) and voltage regulation.
Week 18	• Troubleshoot defects in simple DC regulated power supplies. • Identify components of LED lamps (driver circuit, LED matrix, heat sink). • Check faulty sections and carry out repairing of LED lamps and drivers.	1. Troubleshooting procedures and voltage checking in DC power supply circuits. 2. LED lamp driver circuits: Constant current drivers, SMPS drivers, and surge protection. 3. Safety and environmentally sound disposal procedures for defective electronic components and LEDs.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 19	- Construct a Solar Lantern using Solar PV panel (15W), charge controller (6V, 5A), rechargeable battery (6V, 7Ah), and DC LED lamp (5W). - Construct Solar Day Lighting using manual charge controller (12V, 10A), battery (12V, 100Ah), panel (75W), and DC LED lamps.	- Solar energy fundamentals: Sun path, radiant energy, solar insolation, and tilt angles. - Daily and seasonal variations of sunlight in relation to latitude and longitude. - Solar DC domestic applications: Solar lantern and solar daylighting design principles.
Week 20	- Construct Solar Street Light using dusk-to-dawn charge controller (12V, 10A), battery (12V, 100Ah), PV panel (75W), and 4x LED lights (12V DC, 5W). - Construct Solar Water Pumping system using DC pump (24V), Solar panel (250W), and charge controller (24V, 10A).	- Dusk-to-dawn charge controllers: Working principles and LDR/PV voltage sensing. - Solar DC industrial applications: Solar street lights, garden lights, and security systems. - Solar DC and AC water pumps: Comparison, head calculations, and PV capacity requirements.
Week 21	- Connect Solar panel, solar charge controller, solar battery, and regular inverter to configure a complete Solar Inverter system. - Prepare bill of materials and component specifications for a 1 KW solar PV rooftop installation.	- Off-grid solar PV system components: Inverter conversion, battery sizing, and PV array sizing. - Bill of materials and cost estimation for 1 KW rooftop solar installation. - Quality standards, DC safety, fuses, and DC disconnect switches.
Week 22	- Demonstrate automated manufacturing of solar panels, solar traffic lights, and solar fertilizer sprayers using audio-visual aids. - Demonstrate synchronization between Solar PV inverter and AC utility grid supply using visual aids. - Practice using Solar PV e-learning software simulations.	- Grid-tied (On-Grid) and Hybrid solar systems: Grid synchronization criteria (voltage, frequency, phase angle). - Net metering and gross metering concepts in rooftop solar installations. - Features and applications of Solar PV design and simulation software.
Week 23	- Identify different layers and parts of various underground cables (PVC, XLPE, PILC, armored, unarmored). - Practice preparation of underground cables for termination and jointing (stripping armor, insulation, and sheath).	- Underground Cables: Advantages and disadvantages over overhead lines. - Construction and classification of cables: PVC, XLPE, PILC, oil-filled, and gas-filled cables. - Voltage grading of underground cables and insulation properties.
Week 24	- Practice crimping cable cores using manual and hydraulic crimping tools with suitable dies and lugs. - Demonstrate cable termination kits and practice heat shrink / cold shrink terminations on LT/HT cables.	- Underground cable joints and terminations: Pre-moulded, heat shrinkable, and cold shrink types. - Types of connectors used in UG cables, contact resistance, and crimping procedures. - Galvanic corrosion prevention and proper use of bimetallic lugs.
Week 25	- Practice safe discharging procedures of underground cables before handling. - Make straight-through joint on underground multicore power cable using jointing kit.	- Cable discharging procedures, stored capacitive charges, and safety precautions. - Step-by-step procedure for making straight-through joints on LT underground cables. - Continuity and bonding of cable armor and screen across joints.
Week 26	- Demonstrate jointing of XLPE cables using audio-visual aids. - Demonstrate various field and factory tests on underground cables (insulation resistance, high voltage breakdown, fault location).	- Jointing procedures for XLPE cables: Stress control sleeves and moisture barrier protection. - Standards and testing of UG cables: Type tests, routine tests, insulation resistance, and Murray loop test. - Cable pulling methods, permissible pulling tension, and minimum bending radius.
Week 27	- Demonstrate different Electric Vehicle (EV) charger specifications (AC Level 1, AC Level 2, DC Fast Charger). - Perform installation and connections of Home EV charging station (single-phase). - Perform installation of EV charging station for public commercial locations (3-phase input).	- Electric Vehicle (EV) scenario in India and government policies (FAME, standards). - EV Charging basic theory: AC slow charging vs DC fast charging, CCS, CHAdeMO, and Type-2 connectors. - Safety requirements, dedicated earthing, RCD protection, and maintenance of EV chargers.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 28	• Service, test, and repair electrical bell and buzzer circuits. • Service, inspect, and repair automatic electric iron (thermostat, heating element, and thermal fuse). • Service and test electric kettle, immersion heater, and cooking range.	1. Working principles and circuits of common domestic appliances: Electric bell, buzzer, iron, and kettle. 2. Heating elements: Nichrome specifications, mica/ceramic insulation, and heat control thermostats. 3. Fault tracing and safety testing (insulation resistance and earth leakage) in heating appliances.
Week 29	• Service, inspect, and repair domestic storage-type geyser (thermostat, thermal cutout, heating element, anode rod). • Service, test, and repair induction cooktop (heater plate, IGBT board, fan, sensor circuit).	1. Storage-type Geyser: Construction, sacrificial anode, thermostat, pressure relief valve, and wiring. 2. Induction Cooktop: Operating principle of high-frequency eddy current induction heating. 3. Troubleshooting power supply boards, resonant capacitors, and IGBT failures in induction cookers.
Week 30	• Service, inspect, and repair domestic mixer/grinder and food processor (motor, overload relay, speed selector switch). • Service, test, and replace defective parts of domestic AC table fan, pedestal fan, and ceiling fan.	1. Mixer/Grinder: Universal motor characteristics, brush holder alignment, and overload protector switch. 2. Electric Fans: Split-phase capacitor-start-and-run motor, speed regulators (resistive and electronic). 3. Common mechanical and electrical faults in bearings, bushings, and windings.
Week 31	• Service, inspect, and repair desert cooler, air blower, and BLDC ceiling fan. • Test BLDC motor controller board, hall sensors, and remote interface.	1. Air Coolers: Water pump circuit, fan motor, louvre motor, and multi-speed controls. 2. Brushless DC (BLDC) Ceiling Fans: Principle of operation, permanent magnet rotor, electronic controller. 3. Energy efficiency comparison between conventional induction fan motors and BLDC motors.
Week 32	• Service, inspect, and repair semi-automatic washing machine (wash motor, spin motor, timer, spin brake mechanism). • Demonstrate components and operational cycles of fully automatic top-load and front-load washing machines using visual aids.	1. Semi-automatic Washing Machine: Electrical wiring, dual motor circuits, wash timer, and spin safety interlock. 2. Fully automatic washing machines: Solenoid water valves, pressure switch, drain motor, and electronic control board. 3. Preventive maintenance, vibration damping, and electrical safety.
Week 33	• Demonstrate installation, wiring, testing, and servicing of domestic water pump set and submersible pump. • Test pump motor insulation resistance, check starter panel, and connect float switch.	1. Monoblock pump sets and Submersible pumps: Operating principles and construction. 2. Control panels for submersible pumps: Run capacitor, start capacitor, contactor, and thermal overload relay. 3. Automatic water level controllers (float switches) and dry-run protection mechanisms.
Week 34	• Practice dismantling, core calculation, and rewinding of single-phase step-down transformer. • Reassemble transformer, carry out varnishing, baking, and perform open-circuit & short-circuit tests.	1. Transformer Winding: Types of core, bobbin sizes, turns per volt (TPV) calculations. 2. Primary and secondary winding gauge selection, insulation materials (Empire cloth, Nomex, Kraft paper). 3. Varnishing and baking procedures for rewound transformers.
Week 35	• Practice data recording, coil winding, slot insulation, and rewinding of ceiling fan and table fan stator. • Practice wedging, binding, lead connection, and testing of fan winding.	1. Single-phase induction motor windings: Running winding and Starting winding slot distribution. 2. Slot insulation, coil pitch, pole pitch, number of poles, and synchronous speed calculations. 3. Testing rewound stators for ground faults, short circuits, and open circuits.
Week 36	• Practice single-layer, double-layer, and concentric winding for AC motors and test using growler. • Carry out servicing, maintenance, and rewinding of universal motor armature and field coils.	1. Winding terminology: Concentric, distributed, basket, single-layer, and double-layer windings. 2. Universal motor winding: Armature winding, commutator pitch, equalizer connections, and brush setting. 3. Use of Internal and External Growlers for locating short-circuited and open coils.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 37	• Carry out winding and servicing of submersible pump motor. • Practice coil preparation, slot insertion, and winding of small 3-Phase AC induction motor.	1. Submersible pump motor winding: Waterproof insulation (poly-wrap copper wire) and water-filled motors. 2. 3-Phase Induction Motor Winding: Phase group distribution, 60-degree and 120-degree phase displacement. 3. Star and Delta internal connections of stator windings and insulation testing.
Week 38	• Perform estimation and costing for domestic, commercial, and industrial wiring layouts (labor, materials, accessories). • Demonstrate structured/smart wiring and IoT-based home automation controlling appliances via smartphone. • Practice using computer software for electrical layout design, and study wireman licensing procedures.	1. Principles and guidelines of electrical estimation and costing: Bill of materials, overheads, and labor charges. 2. Smart home automation: IoT devices, Wi-Fi relays, smart switches, and voice assistant integration. 3. Overview of electrical CAD software and statutory rules for obtaining Wireman Permit & Competency Certificate.
Week 39	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project
Week 40	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project
Week 41	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project
Week 42	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project

APPROVAL & SIGNATURES

Sign of Instructor

Sign of Group Instructor (GI)

Sign of Superintendent / Principal