

ANNUAL INSTRUCTIONAL PLAN

ELECTRICIAN (FIRST YEAR – 42 WEEKS)

Trade Name	ELECTRICIAN (Engineering Trade)
NSQF Level & Duration	NSQF Level-4 Two Years (First Year - 42 Weeks)
Academic Session	20____ - 20____
Institute Name & Address	
Instructor Name & Designation	
Group Instructor (GI) Name	
Principal / Supt. Name	

Curriculum as per DGT / CSTARI Guidelines for Electrician CTS Scheme

WEEKLY INSTRUCTIONAL PLAN (WEEK 01 TO WEEK 42)

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
WEEK 01	Safety & Workshop Practice: 1. Visit various sections of the institute and location of electrical installations. 2. Identify safety symbols and hazards. 3. Preventive measures for electrical accidents and practice steps to be taken in such accidents. 4. Practice safe methods of fire fighting in case of electrical fire. 5. Use of fire extinguishers.	Safety Rules & Hazards: 1. Scope of the electrician trade. 2. Safety rules and safety signs. 3. Types and working of fire extinguishers.
WEEK 02	6. Practice elementary first aid. 7. Rescue a person and practice artificial respiration. 8. Disposal procedure of waste materials. 9. Use of personal protective equipment (PPEs). 10. Practice on cleanliness and procedure to maintain workshop hygiene.	4. First aid safety practice. 5. Hazard identification and prevention. 6. Personal safety and factory safety rules. 7. Response to emergencies e.g. power failure, system failure and fire.
WEEK 03	Trade Tools & Allied Fitting: 11. Identify trade tools and machineries. 12. Practice safe methods of lifting and handling of tools & equipment. 13. Select proper tools for operation and precautions in operation. 14. Care & maintenance of trade tools. 15. Operations of allied trade tools. 16. Workshop practice on filing and hacksawing.	8. Concept of Standards and advantages of BIS/ISI. 9. Trade tools specifications. 10. Introduction to National Electrical Code-2011. 11. Allied trades: Introduction to fitting tools, safety precautions. 12. Description of files, hammers, chisels, hacksaw frames, blades, specifications. 13. Types of drills, description & drilling machines.
WEEK 04	Cable Joints & Soldering: 17. Prepare terminations of cable ends. 18. Practice on skinning, twisting and crimping. 19. Identify various types of cables and measure conductor size using SWG and micrometer.	Electrical Fundamentals: 14. Fundamentals of electricity, definitions, units & effects of electric current. 15. Conductors and insulators. 16. Conducting materials and their comparison.
WEEK 05	20. Make simple twist, married, Tee and western union joints. 21. Make britannia straight, britannia Tee and rat tail joints. 22. Practice in Soldering of joints/lugs.	17. Joints in electrical conductors. 18. Techniques of soldering. 19. Types of solders and flux.
WEEK 06	Underground Cables: 23. Identify various parts, skinning and dressing of underground cable. 24. Make straight joint of different types of underground cable. 25. Test insulation resistance of underground cable using megger. 26. Test underground cables for faults and remove the fault.	Underground Cable Theory: 20. Underground cables: Description, types, various joints and testing procedure. 21. Cable insulation & voltage grades. 22. Precautions in using various types of cables.
WEEK 07	Ohm's Law & DC Circuits: 27. Practice on measurement of parameters in combinational electrical circuit by applying Ohm's Law for different resistor values and voltage sources and analyse by drawing graphs. 28. Measure current and voltage in electrical circuits to verify Kirchhoff's Law.	Circuit Laws: 23. Ohm's Law; Simple electrical circuits and problems. 24. Kirchhoff's Laws and applications. 25. Series and parallel circuits. 26. Open and short circuits in series and parallel networks.

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WEEK 08	29. Verify laws of series and parallel circuits with voltage source in different combinations. 30. Measure voltage and current against individual resistance in electrical circuit. 31. Measure current and voltage and analyse the effects of shorts and opens in series circuit. 32. Measure current and voltage and analyse the effects of shorts and opens in parallel circuit.	Resistance Laws: 27. Laws of Resistance and various types of resistors. 28. Series and parallel combinations of resistors.
WEEK 09	33. Measure resistance using voltage drop method. 34. Measure resistance using wheatstone bridge. 35. Determine the thermal effect of electric current. 36. Determine the change in resistance due to temperature. 37. Verify the characteristics of series parallel combination of resistors.	29. Wheatstone bridge; principle and its applications. 30. Effect of variation of temperature on resistance. 31. Different methods of measuring the values of resistance.
WEEK 10	Magnetism & Electromagnetism: 38. Determine the poles and plot the field of a magnet bar. 39. Wind a solenoid and determine the magnetic effect of electric current. 40. Determine direction of induced emf and current. 41. Practice on generation of mutually induced emf.	Magnetic Principles: 32. Magnetic terms, magnetic materials and properties of magnet. 33. Principles and laws of electro-magnetism. 34. Self and mutually induced EMFs.
WEEK 11	Capacitors & Inductors in AC Circuits: 42. Measure the resistance, impedance and determine inductance of choke coils in different combinations. 43. Identify various types of capacitors, charging / discharging and testing. 44. Group the given capacitors to get the required capacity and voltage rating.	Electrostatics & AC Fundamentals: 35. Electrostatics: Capacitor - functions, different types, grouping and uses. 36. Inductive and capacitive reactance, their effect on AC circuit and related vector concepts. 37. Comparison and Advantages of DC and AC systems.
WEEK 12	AC Series & Parallel Circuits: 45. Measure current, voltage and PF and determine the characteristics of RL, RC and RLC in AC series circuits. 46. Measure the resonance frequency in AC series circuit and determine its effect on the circuit.	38. Terms: frequency, Instantaneous value, R.M.S. value, Average value, Peak factor, form factor, power factor and Impedance. 39. Sine wave, phase and phase difference. 40. Active and Reactive power.
WEEK 13	47. Measure current, voltage and PF and determine the characteristics of RL, RC and RLC in AC parallel circuits. 48. Measure the resonance frequency in AC parallel circuit and determine its effects on the circuit. 49. Measure power, energy for lagging and leading power factors in single phase circuits and compare characteristic graphically.	41. Single Phase and three-phase systems. 42. Resonance in series and parallel circuits. 43. Problems on A.C. circuits.
WEEK 14	Three-Phase Systems: 50. Measure Current, voltage, power, energy and power factor in three phase circuits. 51. Practice improvement of PF by use of capacitor in three phase circuit. 52. Ascertain use of neutral by identifying wires of a 3-phase 4-wire system and find phase sequence using phase sequence meter.	Poly-Phase Theory: 44. Advantages of AC poly-phase system. 45. Concept of three-phase Star and Delta connection. 46. Line and phase voltage, current and power in a 3-phase circuit with balanced and unbalanced load. 47. Phase sequence meter.

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WEEK 15	53. Determine effect of broken neutral wire in three phase four wire system. 54. Determine the relationship between Line and Phase values for star and delta connections. 55. Measure the Power of three phase circuit for balanced and unbalanced loads. 56. Measure current and voltage of two phases in case of one phase is short-circuited in three phase four wire system and compare with healthy system.	48. Three-phase power calculations for star and delta systems. 49. Neutral current and floating neutral conditions in 3-phase circuits.
WEEK 16	Cells & Batteries: 57. Use of various types of Chemical cells. 58. Practice on grouping of cells for specified voltage and current under different conditions and care. 59. Prepare and practice on battery charging and details of charging circuit.	Electro-Chemistry: 50. Chemical effect of electric current and Laws of electrolysis. 51. Explanation of Anodes and cathodes. 52. Types of cells, advantages/disadvantages and their applications. 53. Lead acid cell; Principle of operation and components.
WEEK 17	60. Practice on routine, care/maintenance and testing of batteries. 61. Determine the number of solar cells in series / parallel for given power requirement.	54. Types of battery charging, Safety precautions, test equipment and maintenance. 55. Basic principles of Electro-plating and cathodic protection. 56. Grouping of cells for specified voltage and current. 57. Principle and operation of solar cell.
WEEK 18	Wiring Accessories & Extension Boards: 62. Identify various conduits and different electrical accessories. 63. Practice cutting, threading of different sizes & laying Installations. 64. Prepare test boards / extension boards and mount accessories like lamp holders, various switches, sockets, fuses, relays, MCB, ELCB, MCCB etc.	Electrical Wiring Basics: 58. I.E. rules on electrical wiring. 59. Types of domestic and industrial wirings. 60. Study of wiring accessories e.g. switches, fuses, relays, MCB, ELCB, MCCB etc. 61. Grading of cables and current ratings. 62. Principle of laying out of domestic wiring and voltage drop concept.
WEEK 19	Conduit & Casing-Capping Wiring: 65. Draw layouts and practice in PVC Casing-capping, Conduit wiring with minimum to more number of points of minimum 15 mtr length. 66. Wire up PVC conduit wiring to control one lamp from two different places.	63. PVC conduit and Casing-capping wiring system. 64. Different types of wiring - Power, control, Communication and entertainment wiring.
WEEK 20	67. Wire up PVC conduit wiring to control one lamp from three different places. 68. Wire up PVC conduit wiring and practice control of sockets and lamps in different combinations using switching concepts.	65. Wiring circuits planning, permissible load in sub-circuit and main circuit. 66. Staircase, corridor, and multi-point lighting switching techniques.
WEEK 21	69. Wire up the consumers main board with MCB & DB's switch and distribution fuse box. 70. Prepare and mount the energy meter board.	67. Estimation of load, cable size, bill of material and cost. 68. Distribution boards, main switches, and consumer service connection guidelines.
WEEK 22	71. Estimate the cost/bill of material for wiring of hostel/residential building and workshop. 72. Practice wiring of hostel and residential building as per IE rules.	69. Special wiring circuit e.g. godown, tunnel and workshop etc. 70. Specifications and layout rules for commercial/hostel wirings.
WEEK 23	73. Practice wiring of institute and workshop as per IE rules. 74. Practice testing / fault detection of domestic and industrial wiring installation and repair.	71. Inspection and testing of wiring installations (insulation resistance test, polarity test, earth continuity test).
WEEK 24	Earthing Installation: 75. Prepare pipe earthing and measure earth resistance by earth tester / megger. 76. Prepare plate earthing and measure earth resistance by earth tester / megger. 77. Test earth leakage by ELCB and relay.	Earthing Systems: 72. Importance of Earthing. 73. Plate earthing and pipe earthing methods and IEE regulations. 74. Earth resistance and earth leakage circuit breaker (ELCB).
WEEK 25	Illumination: 78. Install light fitting with reflectors for direct and indirect lighting. 79. Group different wattage of lamps in series for specified voltage. 80. Practice installation of various lamps e.g. fluorescent tube, HP mercury vapour, LP mercury vapour, HP sodium vapour, LP sodium vapour, metal halide etc.	Illumination Theory: 75. Laws of Illuminations. 76. Types of illumination systems. 77. Illumination factors, intensity of light. 78. Type of lamps, advantages/disadvantages and their applications. 79. Calculations of lumens and efficiency.

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WEEK 26	81. Prepare decorative lamp circuit to produce rotating light effect/running light effect. 82. Install light fitting for show case lighting.	80. Decorative and showcase lighting schemes, flasher units, and LED driver circuits.
WEEK 27	Measuring Instruments: 83. Practice on various analog and digital measuring Instruments. 84. Practice on measuring instruments in single and three phase circuits e.g. multi-meter, Wattmeter, Energy meter, Phase sequence meter and Frequency meter etc.	Indicating Instruments: 81. Classification of electrical instruments and essential forces required in indicating instruments (deflecting, controlling, damping). 82. PMMC and Moving iron instruments.
WEEK 28	85. Measure power in three phase circuit using two wattmeter methods. 86. Measure power factor in three phase circuit by using power factor meter and verify the same with voltmeter, ammeter and wattmeter readings.	83. Measurement of various electrical parameters using different analog and digital instruments. 84. Measurement of energy and power in three-phase circuits (two-wattmeter method calculations).
WEEK 29	87. Measure parameters using tong tester in three phase circuits. 88. Demonstrate Smart Meter, its physical components and Communication components. 89. Perform meter readings, install and diagnose smart meters.	85. Automatic meter reading infrastructures and Smart meter. 86. Concept of Prosumer and distributed generation. 87. Electrical supply requirements of smart meter, Detecting/clearing tamper notifications.
WEEK 30	90. Practice for range extension and calibration of various measuring instruments. 91. Determine errors in resistance measurement by voltage drop method. 92. Test single phase energy meter for its errors.	88. Errors and corrections in measurement. 89. Loading effect of voltmeter and voltage drop effect of ammeter in circuits. 90. Extension of range (shunts and multipliers) and calibration of measuring instruments.
WEEK 31	Domestic Appliances: 93. Dismantle and assemble electrical parts of various equipment and appliances e.g. cooking range, geyser, washing machine and pump set.	Domestic Appliances Principles: 91. Working principles and circuits of common domestic electrical appliances. 92. Concept of Neutral and Earth connections in appliances.
WEEK 32	94. Service and repair of electric iron, electric kettle, cooking range and geyser. 95. Service and repair of induction heater and oven.	93. Construction, heating elements, thermostats and repair procedures of heating appliances. 94. Induction heating theory and electronic control cards.
WEEK 33	96. Service and repair of mixer and grinder. 97. Service and repair of washing machine.	95. Universal motor operation, speed control, faults and maintenance of mixer/grinder. 96. Washing machine mechanical timer, motor, clutch and drain valve maintenance.
WEEK 34	Single Phase Transformers: 98. Verify terminals, identify components and calculate transformation ratio of single-phase transformers. 99. Perform OC and SC test to determine efficiency of single-phase transformer.	Transformer Fundamentals: 97. Working principle, construction and classification of transformer. 98. Single phase and three phase transformers. 99. Turn ratio and e.m.f. equation.
WEEK 35	100. Determine voltage regulation of single-phase transformer at different loads and power factors. 101. Perform series and parallel operation of two single phase transformers.	100. Voltage Regulation and efficiency calculations. 101. Series and parallel operation of transformer (conditions for paralleling). 102. Auto Transformer and instrument transformers (CT & PT).
WEEK 36	Three Phase Transformers: 102. Verify the terminals and accessories of three phase transformer HT and LT side. 103. Perform 3 phase operation (i) delta-delta, (ii) delta-star, (iii) star-star, (iv) star-delta by use of three single phase transformers.	103. Method of connecting three single phase transformers for three phase operation. 104. Types of Cooling, protective devices (Buchholz relay, conservator, breather), bushings and termination etc.
WEEK 37	104. Perform testing of transformer oil. 105. Practice on winding of small transformer. 106. Practice of general maintenance of transformer.	105. Testing of transformer oil (dielectric strength testing). 106. Materials used for winding and winding wires in small transformer. 107. Scheduled maintenance procedures for power/distribution transformers.
WEEK 38	On the Job Training (OJT) / Group Project Work: • Practical industry exposure, project execution, report preparation and presentation.	• Review of technical concepts, industry safety standards, project documentation and evaluation guidelines.
WEEK 39	On the Job Training (OJT) / Group Project Work: • Practical industry exposure, project execution, report preparation and presentation.	• Review of technical concepts, industry safety standards, project documentation and evaluation guidelines.

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WEEK 40	On the Job Training (OJT) / Group Project Work: • Practical industry exposure, project execution, report preparation and presentation.	• Review of technical concepts, industry safety standards, project documentation and evaluation guidelines.
WEEK 41	On the Job Training (OJT) / Group Project Work: • Practical industry exposure, project execution, report preparation and presentation.	• Review of technical concepts, industry safety standards, project documentation and evaluation guidelines.
WEEK 42	On the Job Training (OJT) / Group Project Work: • Finalization of project report, comprehensive trade revision, viva preparation and mock practical test.	• Comprehensive theory revision, examination pattern orientation, question bank discussion and final evaluation.

APPROVAL & SIGNATURES

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Sign of Instructor	Sign of Group Instructor (GI)	Sign of Superintendent / Principal