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

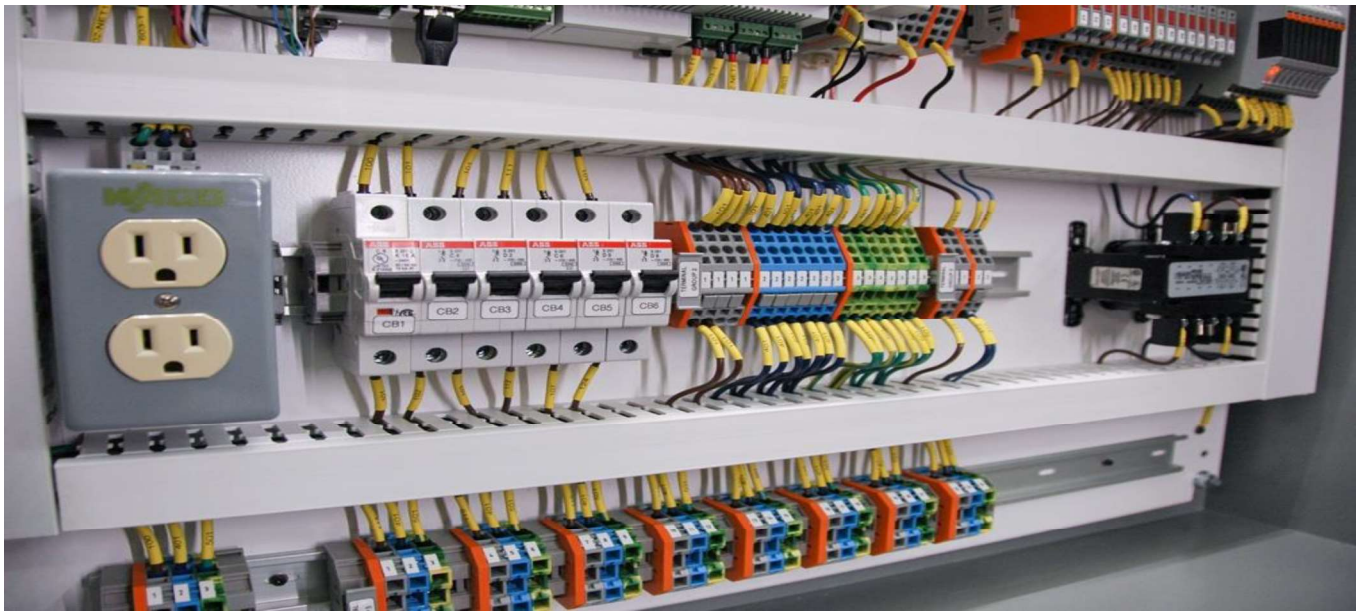
COMPETENCY BASED CURRICULUM

WIREMAN

(Duration: Two Years)
Revised in July 2022

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – POWER

Directorate General of Training

WIREMAN

(Engineering Trade)

(Revised in July 2022)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

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		Area and perimeter of circle, semi-circle, circular ring, sector of circle, hexagon and ellipse Surface area and volume of solids - cube, cuboid, cylinder, sphere and hollow cylinder **Trigonometry** Measurement of angles Trigonometrical ratios Trigonometrical tables
Project Work / Industrial Visit		

SYLLABUS FOR WIREMAN TRADE			
SECOND YEAR			
Duration	**Reference Learning Outcomes**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 115 Hrs; Professional Knowledge 30 Hrs	Plan, draw, install and test different types of Commercial wiring including advanced systems. Install temporary electrical wiring at construction site. (Mapped NOS: PSS/N1707)	109. Practice wiring for communication circuits and computer networks using UTP, STP, Co-axial and optical fibre cables. (11 hrs) 110. Wire-up lighting system for control using motion detector. (12 hrs) 111. Wire-up panel board for control of lights and fans from wireless remote. (12	**Commercial Wiring:** Wiring in commercial building- their special precautions as per I.E. rules. Different types of wiring - Power, control, Communication and entertainment wiring. Wiring circuits planning, Cabling in healthcare facilities;

		hrs) 112. Demonstrate wiring and components of fire alarm system, interior siren, control & signalling using visual aids. (12 hrs) 113. Practice installation of 1 ϕ & 3 ϕ online/ offline UPS wiring and test. (12 hrs) 114. Install and wire up CCTV camera. (08 hrs) 115. Install inverter and carry out wiring. (12 hrs) 116. Demonstrate wiring plan, lighting fixtures, receptacles and sensors for bathing area. (12 hrs) 117. Demonstrate multi-storeyed building wiring. (12 hrs) 118. Install temporary LV electrical panels and lighting arrangements for construction site. (12 hrs)	importance of grounding, shielding and routing in accordance with life safety codes to minimize interference with medical equipment. GFCI (Ground-fault circuit interrupter) receptacles. (30 hrs)
Professional Skill 110 Hrs; Professional Knowledge 28 Hrs	Plan, draw, estimate material/ cost, install and test different types of industrial wiring system as per IE rules. Layout cables for various purposes including cable management. (Mapped NOS: PSS/N1707)	119. Identify accessories and tools required for industrial wiring. Demonstrate various switchboards, switchgears, industrial control panels and accessories. (06 hrs) 120. Demonstrate cable tray, raceways, auxiliary gutter, cable bus assembly, trench for passing of cables. (06 hrs) 121. Determine minimum ampacity and size of conductors for continuous	**Industrial Wiring:** Adverse conditions likely to affect the installation. Degree of mechanical and electrical protection necessary. Peak-Non-peak Loads in Office Buildings Lighting Design; lighting power density, Estimation of load, cable size,

		and non-continuous loads. (06 hrs) 122. Practice installing cables in conduit as per IE rules. (06 hrs) 123. Practice cutting, threading and bending of metallic conduit. (08 hrs) 124. Identify different bus bars, practice joining and installation including overhead bus bar system as per IE rules. (10 hrs) 125. Prepare bill of material, plan and practice wiring of an institute and workshop as per IE rules. (16 hrs) 126. Demonstrate Hospital, Tunnel and Godown wiring using visual aids. (06 hrs) 127. Practice testing / fault detection of industrial wiring installations and repair. (14 hrs) 128. Practice laying of cables in raceways and trenches. (05 hrs) 129. Demonstrate various cable glands. Practice cable entry on a switch cabinet wall. (05 hrs) 130. Practice passing of cables through cable entry plate for standard cables without connectors, up to IP 68 rated protection. (05 hrs) 131. Practice split cable entry for multiple pre-terminated	bill of material and cost. Inspection and testing of wiring installations. Special wiring circuit e.g. hospital, godown, tunnel and workshop, etc. Danger notice as per IE rules **Cable Management:** Types of cables, their use, Various cable glands Introduction to IP ratings (Ingress protection) and IP Codes format. Importance of Bonding and grounding, various types. Testing of cables, locating faults, open circuit, short circuit and leakage in cables. (28 hrs)

		cables, up to IP 65 rated protection. (05 hrs) 132. Demonstrate bonding and grounding of raceways, cable assembly and panels. (04 hrs) 133. Demonstrate use of earth rods. Test underground cables for faults and remove the fault. (08 hrs)	
Professional Skill 60 Hrs; Professional Knowledge 20 Hrs	Plan, install and test illumination system including domestic, commercial and industrial requirements. Connect, program and operate PAR light on DMX controller (Stage light control). (NOS: PSS/N1707)	134. Group different wattage of lamps in series for specified voltage. (03 Hrs) 135. Practice on low voltage track system, mains voltage track system and LED battery powered lighting. (07 hrs) 136. Prepare decorative lamp circuit to produce rotating/ running light effect. (08 Hrs) 137. Install different display spotlights and LED downlights. (08 Hrs) 138. Demonstrate kitchen under-cabinet lighting, shelf lighting, closet lighting and cove lighting. (05 hrs) 139. Practice installation of various lamps e.g. fluorescent tube, HP mercury vapour, LP mercury vapour, HP sodium vapour, LP sodium vapour, metal halide, LED lights, pendant lighting. (15 hrs) 140. Assemble, program and Practice on DMX controller for operation of PAR lights.	**Illumination & Stage Light Control:** Laws of Illuminations. Types of illumination system. Illumination factors, intensity of light. Type of lamps, advantages/ disadvantages and their applications. Calculations of lumens and efficiency. Spotlights, downlights, Strip lights Various reflectors; PAR (Parabolic aluminized reflector), MR (Multi-faceted reflector) LED video wall panel applications. (20 hrs)

		(10 hrs) 141. Visual demonstration of LED video wall panel installation, hardware & software setup. (04 hrs)	
Professional Skill 65 Hrs; Professional Knowledge 20 Hrs	Assemble simple electronic circuits, repair CFL, LED lamps and DC regulated power supply. (Mapped NOS: PSS/N6002)	142. Determine the value of resistance by colour code and identify types. (05 hrs) 143. Determine V-I characteristics of semiconductor diode. (05 hrs) 144. Identify circuit components and their terminals viz, diode, transistor, capacitors, regulator. (06 hrs) 145. Construct half wave, full wave and bridge rectifiers. (15 hrs) 146. Practice soldering on basic electrical and electronic circuits. (06 hrs) 147. Troubleshoot defects in simple power supplies. (05 hrs) 148. Identify different components and circuits of CFL & LED lamps. (08 hrs) 149. Check faulty section/ components of LED & CFL and practice for repairing. (15 hrs)	**CFL/LED Lamps & DC regulated power supply;** Resistors; colour code, types and characteristics. Diode; P-N junction, classification, specifications, biasing and characteristics. Rectifier circuit; half wave, full wave, bridge rectifiers and filters. Active and passive components. Functioning of components used in CFL and LED circuits. CFL and LED lamp's circuit. Safety and disposal procedure (20 hrs)
Professional Skill 80 Hrs; Professional Knowledge	Assist in Installation and commissioning of small solar plant, solar pumps and construct	150. Construct a solar lantern using Solar PV panel (15W), Charge controller (6V, 5A), output control circuit for variable illumination,	**Solar Power Plant:** Solar energy fundamentals. Study of Sun path (east to west, North to south and south to north movement).

20 Hrs	Solar DC appliances. (Mapped NOS: PSS/N6003)	Rechargeable battery (6V, 7Ah) and DC LED lamp (5W). (15 hrs) 151. Construct a Solar Day lighting using manual charge controller (12V, 10A), Solar battery (12V, 100Ah), Solar panel (75 W) and 4X LED light (12V DC, 5W). (10 hrs) 152. Construct a Solar Street light using dusk to dawn charge controller (12V, 10 A), Solar battery (12V, 100 Ah), Solar panel (75 W) and 4X LED light (12V DC, 5W). (10 hrs) 153. Construct a Solar water pump using a DC pump (24 V), Solar Panel (250 W), Charge controller (24 V, 10 A). (12 hrs) 154. Connect a Solar panel (10W), Solar charge controller (12V, 10A), Solar battery (12V, 100 Ah) and a normal inverter and convert to a solar inverter. (10 hrs) 155. Prepare bill of material for a 1 KW solar PV installation. (10 hrs) 156. Demonstrate through audio visual aids; automatic manufacturing of solar panels, installation of solar street light, solar fertilizer sprayer, solar water pump and solar traffic light. (09	Study of daily and seasonal changes of sunlight. Angle of inclination of radiant light and its relation with latitude and longitude of different locations on Earth. Solar DC domestic application: Making of solar lantern. Solar Day lighting. Solar Garden Lights. Safety in DC system. Quality standards List out the inventory list of equipments. Solar DC industrial application: Solar street light. Solar home lighting system. Solar Security system. Solar DC water pump. Differentiate AC and DC solar pumps and their PV requirements for various HP capacities. Solar PV e-learning software. (20 hrs)

		hrs) 157. Demonstrate synchronization between Solar Panel & AC grid supply using visual aids. (04 hrs)	
Professional Skill 85 Hrs; Professional Knowledge 20 Hrs	Plan, prepare and carry out jointing of LT/HT underground cables with due care and safety. (Mapped NOS: PSS/N2512)	158. Identify different parts of various underground cables. (05 hrs) 159. Practice preparation of cables for termination and joining. (12 hrs) 160. Demonstrate termination kits and practice on terminations of LT/HT cables. (15 hrs) 161. Practice discharging procedure of underground cables. (08 hrs) 162. Make straight joint of different types of underground cable. (25 hrs) 163. Demonstrate jointing of XLPE cables using audio-visual aids. (12 hrs) 164. Demonstrate various tests on underground cables. (08 hrs)	**Underground cable joints**: Need of cables, advantages and disadvantages, various types viz., PVC, XLPE, PILC, oil filled, etc. Cable insulation & voltage grades. Joints and terminations; pre-moulded, heat shrinkable, extrusion molded joints Slip on, cold shrink terminations. Types of connectors used in the cable, current path. Methods of conductor connection, contact resistance. Galvanic corrosion and use of bimetals. Connectivity for cable screen and armour, mechanical protection Kits for joints and terminations. Cable termination to equipment Standards and testing; type, routine, field test, Stress control (20 hrs)
Professional Skill 20 Hrs; Professional Knowledge 05 Hrs	Install Electric Vehicle charging stations and carry out preventive/breakdown maintenance.	165. Demonstrate different charger specifications. (04hrs) 166. Perform installation of EV charging Station for Public places. (08 hrs) 167. Perform installation of Home EV charging stations.	EV scenario in India and EV Charging basic theory. EV Charging safety requirements. (05 hrs)

		(08 hrs)	
Professional Skill 135 Hrs; Professional Knowledge 40 Hrs	Install and repair domestic appliances viz., electric kettle, food processor, fan, washing machine, geyser, water pump etc. including repair of electrical faults in refrigerator, window and split AC. (Mapped NOS: PSS/N6003, PSS/N4402, PSS/N1711)	168. Service and repair of bell/ buzzer. (06 hrs) 169. Service and repair of electric iron, electric kettle, cooking range and geyser. (15 hrs) 170. Service and repair of induction heater. (06 hrs) 171. Service and repair of mixer/grinder and food processor. (20 hrs) 172. Service and repair of fan, blower, cooler, etc. (15 hrs) 173. Service and repair of semi-automatic washing machine. Demonstrate components of fully automatic top & front load washing machine using visual aids. (15 hrs) 174. Service and repair of refrigerator. (15 hrs) 175. Demonstrate installation and repair of pump set and submersible pump. (15 hrs) 176. Carry out repair of electrical circuit of window and split AC. (20 hrs) 177. Demonstrate installation and maintenance of split AC using visual aids. (08 hrs)	**Domestic appliances:** Working principles and circuits of common domestic electrical appliances; Bell, buzzer, electric iron, kettle, cooking range, geyser, induction heater, mixer, grinder, juicer, food processor, fan, pump set, washing machine, refrigerator and air conditioner etc. Concept of Neutral and Earth. (40 hrs)
Professional Skill 130 Hrs; Professional Knowledge	Perform winding of small transformers and motors viz., ceiling fan, table fan, mixer/grinder, submersible pump,	178. Practice winding of single-phase transformer. (12 hrs) 179. Practice on ceiling fan and table fan motor winding. (12 hrs) 180. Carry out maintenance,	**Winding:** Concentric/ distributed, single/ double layer winding and related terms. Troubleshooting of single-phase

35 Hrs	etc. (Mapped NOS: PSS/N4402)	service and repair of single-phase AC motors viz., mixer/grinder, table fan pumps etc. (25 hrs) 181. Practice on single/double layer and concentric winding for AC motors and testing. (30 hrs) 182. Carry out maintenance and servicing of universal motor. (12 hrs) 183. Carry out winding of submersible pump. (15 hrs) 184. Practice winding of small 3-ϕ AC motor. (24 hrs)	AC induction motors and universal motor. (35 hrs)
Professional Skill 40 Hrs; Professional Knowledge 10 Hrs	Carry out Estimation & costing for different wiring systems and ready to adopt structured / smart wiring concept for automation and IoT applications.	185. Perform estimation and costing for different types/scheme of wiring for labour, materials and accessories as per layout. (25 hrs) 186. Demonstrate structured wiring/ smart wiring for home & office automation through visual aids. (05 hrs) 187. Visual demonstration of IoT based home automation/ control of electrical appliances through smartphone. (05 hrs) 188. Demonstrate software available for electrical wiring and circuits. (05 hrs)	Concept and Principles of estimation and costing. Different wiring layouts and Bill of material; domestic, commercial, and industrial wiring. Smart wiring concept Procedure for taking wireman permit and competency certificate. (10 hrs)
Engineering Drawing: 40 Hrs.			
Professional Knowledge ED 40 Hrs.	Read and apply engineering drawing for different application in the field	**<u>Engineering Drawing:</u>** Reading of Electrical Sign and Symbols. Sketches of Electrical components. Reading of Electrical wiring diagram and Layout diagram. Reading of Electrical earthing diagram. Drawing the schematic diagram of plate	

	of work.	and pipe earthing. Drawing of Electrical circuit diagram. Drawing of Block diagram of Instruments & equipment of trades.
Workshop Calculation & Science: 32 Hrs.		
Professional Knowledge WCS 32 Hrs.	Demonstrate basic mathematical concept and principles to perform practical operations. Understand and explain basic science in the field of study.	**<u>Workshop Calculation & Science:</u>** **Friction** Friction - Lubrication **Algebra** Algebra - Addition, subtraction, multiplication & division Algebra - Theory of indices, algebraic formula, related problems **Elasticity** Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus **Profit and Loss** Profit and loss - Simple problems on profit & loss Profit and loss - Simple and compound interest **Estimation and Costing** Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade. Estimation and costing - Problems on estimation and costing
Project work / Industrial visit		

SYLLABUS FOR CORE SKILLS
1. Employability Skills (Common for all CTS trades) (120 Hrs. + 60 Hrs.)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in / dgt.gov.in