SYLLABUS FOR WIREMAN TRADE			
SECOND YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 100 Hrs; Professional Knowledge 36 Hrs	Construct and test Half–wave, full-wave, and bridge rectifiers with filter & without filter. Trouble shoot and service of DC regulated power supply.	110. Identify the terminals of LED, Diode, transistor, Zener diode, UJT, SCR, regulator ICs and test it. (25 hrs.)	LED, Diode, types of transistor, UJT, SCR, regulator ICs and Zener diode uses and its application. (09 hrs)
		111. Construct and test variable DC power supply and trouble shoot the defects in a simple power supply. (25 hrs.)	IC- voltage regulator pin configurations and applications. (09 hrs)
		112. Construction & testing of various electrical circuits with different accessories. (15 hrs.) 113. Connection of Calling Bell, Buzzer, Electric Iron, Heater, Light & Fan etc. (15 hrs.) 114. Practice in **soldering** and brazing by following Indian Electricity rules. (20 hrs.)	**Common Electrical Accessories**, their specifications-Explanation of switches, lamp holders, plugs and sockets etc. Development of domestic circuits using switches, fuse, MCB, sockets, lamp, fan, calling bell/buzzer, Two way switch, I.C.T.P, I.C.D.P, MCCB, ELCB, RCCB etc. Importance of Neutral, effect of opening of neutral wire. **Soldering**- Solders, flux and soldering techniques. Types of soldering irons-their proper use. (18 hrs)
Professional Skill 150 Hrs; Professional Knowledge 54 Hrs	Interpret the constructional features, working principles of DC machine. Starting with suitable starter, running,	**D.C. GENERATORS,** 115. Identification of the parts of D.C. Generators. (5 hrs.) 116. Testing and measuring the field and Armature resistances. (5 hrs.) 117. Dismantle the D.C.	Introduction to D.C Generators and working principle, parts of D.C. Generator. Classification of Generators- Self excited and separately excited-their application in practical field. (09 hrs)

	forward and reverse operation and speed control of DC motors. Conduct the load performance test of DC machine with due care and safety. Maintain and troubleshoot of DC machines.	Generator and Reassemble and test for its working. (15 hrs.)	
		118. Identification of different parts of generators testing fields & Apparatus. (12 hrs.) 119. Insulation resistance measurements. (8 hrs.) 120. Building up of voltage and loading generators. (10 Hrs.) 121. Servicing of generators including replacing of carbon brushes. (20 hrs.)	Types and characteristics of D.C. Generators – Series, Shunt and compound, their applications. Explanation of Armature reaction, interlopes, commutation and EMF equation of DC generators. Parallel operation of Generators. (18 hrs)
		MOTORS & STARTER: 122. Practice in connecting generators- Generators- Testing of D.C. Machines by Megger. (12 hrs.) 123. General maintenance of D.C. machines. (13 hrs.)	**I**ntroduction to D.C. Motor- Working principle, types of motors Explanation of terms used Torque, speed, Back E.M.F. etc. Characteristics, Speed control of DC motors. (09 hrs)
		124. Testing of D.C. Motors - connect run and change direction of rotation. (12 hrs.) 125. Study of DC starters- 2 point 3 point and 4 point speed control of D.C. Motors and speed measurement. (13 hrs.) 126. Use Revolution counter. (6 hrs.) 127. Trouble shooting and fault rectification. Identify and test different types of D.C motors. (19 hrs.)	Necessity of starter- Types of starters, 2 point 3 point and 4 point starters, Protective devices used. Methods of speed control, advantages, disadvantages & Industrial applications. Trouble shooting and fault rectification. (18 hrs)
Professional Skill 50 Hrs;	Interpret the constructional features, working	128. Tests on 3 phase circuit. (10 hrs.) 129. Current and voltage	Introduction to A.C. Poly phase systems- advantages, 3 phase star delta. Terms used in 3Ø systems,

Professional Knowledge 18 Hrs	principles of single phase and 3 phase AC motors. Starting with suitable starter, running, forward and reverse operation and speed control of AC motors with due care and safety.	measurement in star and delta connections. (12 hrs.) 130. Measurement A.C. 3 ph. power. (18 hrs.) 131. Determine the V and I relation in Star/Delta connections in a 3-Ph motor. (10 hrs.)	connection and their relations w.r.t. current and voltage. Principle of measurement of A.C. 3 ph. Power. Simple calculation of A.C. 3 phase circuit parameter - I, V, Z & P.F. etc (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Interpret the constructional features, working principles of Alternator set. Test, Wire-up and run alternator. Synchronization of Alternator with due care and safety.	**A.C. GENERATORS, MOTORS & STARTERS** 132. Identification of Alternator of parts. (10 hrs.) 133. Running of Alternator by prime mover and loading it to find out regulation at different loads. Testing of alternators (IR tests). (28 hrs.) 134. Connect and test Parallel operation of alternators. (12 hrs.)	Parts and construction of Alternators, principle of working, types of Alternators, EMF equation. Various applications and power rating of alternators. General idea of loading and regulation of Alternator. Parallel operation of Alternators, synchronising methods. (18 hrs)
Professional Skill 175 Hrs; Professional Knowledge 63 Hrs	Interpret the constructional features, working principles of single phase and 3 phase AC motors. Starting with suitable starter, running, forward and reverse operation and speed control of AC motors with due care and safety.	135. Demonstration and practice on A.C single phase motors starting and running for specific requirements. (25 hrs.)	Introduction to A.C single phase motors and types. Capacitors start/run- start and run. FHP motors and their uses. Various application of A.C single phase motors. (09 hrs)
		136. Constructional details of three phase squirrel cage induction motor and slip ring induction motor. (12 hrs.) 137. Determination of slip and efficiency. (8 hrs.) 138. Familiarization of DOL	**Three phase Induction motor: -** Construction, Principle of operation of Three phase induction motor. Squirrel cage induction motor and slip ring induction motor. Rotor slip, rotor frequency and rotor torque. Factors affecting torque.

		starter, Star- delta starter, Autotransformer starter and slip ring IM starter. (15 hrs.) 139. Phase sequence test on three phase IM motors, Single phasing preventer. (14 hrs.) 140. Identification of A.C and D.C motors (identify motors from the stock/scrap). (8 hrs.) 141. Construction of simple control circuits using push button and contactors. (18 hrs.)	Effect of variation in applied voltage. Starting methods. Speed control methods. Importance of phase sequence in three phase induction motor. Single phasing preventer. (27 hrs)
		142. Connect and run the A.C single phase and 3-Ph motors by using starters. (25 hrs.)	Starters - DOL starter, Star – delta starter and Auto transformer starter. (09 hrs)
		143. A.C. motor panel wiring (slip ring Induction type) (13 hrs.) **POWER WIRING FOR DC & AC MOTORS** 144. Practice power and control circuits on boards. (10 hrs.) 145. Assembly & testing of the frame for a panel – suitable for motor generator set. I.S. 3072 Part-II of 1861. (15 hrs.) 146. Erection of panel board, fixing of controlling and starting equipment, necessary meters. (12 hrs.)	Description of starter delta starter (manual, semi and Auto). Formative arrangement of a motor resistance starter for slip ring induction motor. Motor control circuit and starting devices. Power and control wiring circuits of AC motors. (18 hrs)
Professional Skill 75 Hrs; Professional	Interpret the types, constructional features, working principles of	147. Identification of types of transformers. (15 hrs.) 148. Test / check the polarity of single phase transformer.	**TRANSFORMERS –** Power Transformer – Its construction, working, performance, parallel operation of

Knowledge 27 Hrs	transformer (single & three phase) Connect and test Transformer.	(10 hrs.) 149. Insulation testing of single phase and Three Phase. (10 hrs.) 150. Conducting No-load/O.C. & short circuit tests. (10hrs.) 151. Connection of transformers, efficiencies of transformers, parallel operation of transformer. (20 hrs.) 152. Ratio test and voltage regulation. (10 hrs.)	transformer, their connections. Cooling of transformer, S.C. & O.C. tests. Regulation and efficiency, Specifications, problems on e.m.f. Equation, transformation ratio. Characteristics of ideal transformer. Construction of core, winding shielding, auxiliary parts breather, conservator. Buchholz's relay, other protective devices. Transformer oil testing and Tap changing off load and on load. Transformer bushings and termination. Auto transformer- Its construction, working, performance & uses. (27 hrs)
Professional Skill 225 Hrs; Professional Knowledge 81 Hrs	Prepare single line diagram and layout plan of electrical transmission & distribution systems and power plants with knowledge of principle applied. Make and test power connection to substation equipments with care and safety.	153. Familiarize and practice operation of OH line components. (20 hrs.) 154. Visit to generating station (Thermal/ Hydro/Nuclear) Visit to a sub-station to familiarize OH line components. (41 hrs.) 155. Prepare a line diagram of the institute/ ITI supply system. (20 hrs.)	**GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRICAL POWER** Generation of Electricity and their types. General idea about overhead transmission, distribution (LV, MV & HV) and their types of accessories used. General arrangement and maintenance of outdoor type of substation. Explanation of overhead bus bar, side by bar. Bus trunking and rising mains. I.E. rules regarding panel erection, bus bar, spacing bus bar chamber, danger boards. Connection of high voltage metering equipment used with bus bar. (27 hrs)
		156. Demonstration, testing and use of line protecting	Types of Distribution, Explanation of line protecting devices and

		devices as per I.E. Rules. (10 hrs.) 157. Visit to Distribution - station. (15 hrs.)	their general principle. Brief description of connection of places of use. (09 hrs)
		158. Familiarization and operation of various CBs ACB, VCB, SF6, OCB etc. (15 hrs.) 159. Visit to sub-station. (20 hrs.) 160. Demonstration and Tests on Multi range switches, Rotary switches. (12 hrs.) 161. Cooker control Panel, Power circuit switches Thermostats. Mercury switches, visit/in plant training in a industry. (12 hrs.)	**SUBSTATION EQUIPMENTS** Switchgear-CBs – ACB, VCB, SF6, OCB etc. protection schemes, CT/PT-Protective relays, lightning arrestors, Explanation of different types of switches and switches gears multi Range switches, rotary switches, cooker control panels, power circuit switches, thermostat, mercury switches etc. (27 hrs)
		162. Familiarize the parts of substations low and high voltages. (20 hrs.)	**TYPES OF SUBSTATIONS - INDOOR, OUTDOOR & POLE MOUNTING** Substation construction: i. Outdoor and Indoor substation. ii. E.H.T. substation iii. H.T. substation iv. Medium & low voltage substation (Pole mounting type) (09 hrs)
		163. Demonstration and practice in terminating an U.G. cable to a bus bar chamber. (20 hrs.) 164. Crimping lugs to the conductors of U.G. cable and connection to bus bar Loop connection for other circuit. (20 hrs.)	**U.G. CABLE** Construction of cable, Types , Application & methods of jointing UG cable & testing General idea of laying method and jointing precautions to be observed and different accessories used for medium voltage termination. (18 hrs)

Professional Skill 25 Hrs; Professional Knowledge 09 Hrs	Interpret the constructional features, working principles of Alternator set. Test, Wire-up and run alternator. Synchronization of Alternator with due care and safety.	**Synchronizing** 165. Building up the alternator output voltage, synchronizing of bus bar voltage with generated voltage. (25 hrs.)	Need of Synchronizing, various methods, precautions to be observed while Synchronizing. (09 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Select, assemble, test and wire-up control panel.	**Control panel wiring** 166. Preparation of control panel board and its layout fixing of indicating meters /Instruments, Control devices, Protection devices. (35 hrs.) 167. Fixing of cable entry and exit points (15 hrs.)	Control Panel elements, types and specifications. Layout and installation of panel board, Panel board wiring methods, colour coding of cables for its easy identification. Grouping and numbering of cables by using ferrules. (09 hrs)
		168. Preventive maintenance and routine tests. (8 hrs.) 169. Fault location and remedy practice both in domestic and industrial wirings. (10 hrs.) 170. Practice in fixing conduit along with the girder, steel structures station etc. (7 hrs.)	Importance and advantages of maintenance. Points to be observed to maintain the installation, preventive maintenance and routine tests. Common faults, causes and remedies in domestic and industrial wiring installation, Methods of Locating faults. (09 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Plan, estimate and costing of different types of wiring system as per Indian Electricity rule.	**Planning, Estimation and Costing of Wiring-** 171. Planning and Preparation of layout for domestic, commercial, Multi storied building wiring and workshop electrical wiring. (50 hrs.)	Concept and Principle of plan, estimation and cost. Preparation of complete house wiring layout, industrial wiring, commercial wiring for office Lodge, Hospital, Bank, Hotels etc. I.E. rules for Multi-storied buildings. (27 hrs)

		172. Estimation and costing of Labour, materials and accessories as per layout. (25 hrs.)	

Project Work (work in a team)

(i) Over hauling and Testing of 3 phase Induction motor

(ii) Over hauling and testing of Ceiling / Table Fan.

(iii) Preparation of series test board with indicating digital metres.

(iv) Construction and test regulated power supply of 6-12 Volt DC.

(v) Construct and Test Decorative running LED lamp assembly.

(vi) Installation of Pump set.