SYLLABUS FOR ELECTROPLATER TRADE			
FIRST YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 150 Hrs; Professional Knowledge 42 Hrs	Prepare profile with an appropriate accuracy as per drawing following safety precautions.	1. Visit various sections of the institutes and location of electrical installations. (05 hrs.) 2. Identify safety symbols and hazards. (05 Hrs.) 3. Preventive measures for electrical accidents and practice steps to be taken in such accidents. (05 hrs.) 4. Practice safe methods of fire fighting in case of electrical fire. (05 hrs.) 5. Operate a fire extinguisher and put out a fire. (05 Hrs.) 6. Practice elementary first aid. (05 hrs.) 7. Rescue a person and practice artificial respiration. (05 Hrs.) 8. Disposal procedure of waste materials. (05 Hrs.) 9. Practice on cleanliness and procedure to maintain it. (05 hrs.) 10. Identify hazardous chemicals. (05 hrs.)	Familiarization with the department, institute, trades etc. Introduction to Electroplater trade. Safety rules and safety signs. Types and working of fire extinguishers. Various safety measures involved in the Industry. First aid safety practice. Hazard identification and prevention. Personal safety and factory safety. Response to emergencies e.g. power failure, system failure and fire etc. Hazardous chemicals and safety. (14 hrs)
		11. Identify trade tools and machineries. (10Hrs.) 12. Practice on preparing T-joint, straight joint and	Allied trades: Introduction to fitting tools, safety precautions. Description of files, hammers, chisels

		dovetail joint on wooden blocks. (15 Hrs.) 13. Practice sawing, planning, drilling and assembling for making a wooden switchboard. (15 Hrs.) 14. Practice in marking and cutting of straight and curved pieces in metal sheets, making holes, securing by screw and riveting. (15Hrs.) 15. Workshop practice on filing and hacksawing. (15Hrs.) 16. Workshop practice on drilling, chipping, internal and external threading of different sizes. (15 Hrs.) 17. Prepare an open box from metal sheet. (15Hrs.)	hacksaw frames, blades, their specification and grades. Marking tools description and use. Types of drills, description & drilling and grinding machines. Various wooden joints. Carpenter and Sheet metal tools: Description of marking & cutting tools. Types of rivets and riveted joints. Use of thread gauge. Physical and mechanical properties of engineering metals: colour, weight, structure, conductivity, magnetic, fusibility and specific gravity. Mechanical properties: ductility, malleability hardness, brittleness, toughness, tenacity, and elasticity. (28 hrs)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Prepare electrical wire joints, carry out soldering and crimping.	18. Prepare terminations of cable ends (06hrs.) 19. Practice on skinning, twisting and crimping. (06Hrs.) 20. Identify various types of cables and measure conductor size using SWG and micrometer. (06Hrs.) 21. Make simple twist, married, Tee and western union joints. (10Hrs.) 22. Make britannia straight, britannia Tee and rat tail joints. (10Hrs.)	Conductors and insulators. Conducting materials and their comparison. Wires and cables- types, measurement of wire size, voltage grading. SWG and outside micro meter. Crimping and crimping tool. Joints in electrical conductors. Techniques of soldering. Types of solders and flux. (14 hrs)

		23. Practice in Soldering of joints/ lugs. (12Hrs.)	
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Verify characteristics of electrical and magnetic circuits.	24. Identify polarity of DC supply by various methods. (05 hrs.) 25. Connection of voltmeter and ammeter and to measure voltage current and power. (05hrs.) 26. Verify laws of series and parallel circuits with voltage source in different combinations. (08Hrs.) 27. Verify the characteristics of series parallel combination of resistors. (05Hrs.) 28. Verify the relationship between V,I and R in a DC circuit. (08hrs.) 29. Measure the value of resistance by Ohm's Law. (05Hrs.) 30. Trace the magnetic poles of a bar magnet. (05 hrs.) 31. Prepare an electromagnet (05 hrs.) 32. Identify the phase and neutral in single phase AC supply by various methods. (04hrs.)	Fundamentals of electricity, definitions, units & effects of electric current. Types of electrical supply. Comparison and Advantages of DC and AC. Polarity test in DC. Resistance and specific resistance. Laws of Resistance and various types of resistors. Measurement of low and medium resistance. Electrical measuring instruments such as Voltmeter, Ammeter and Ohmmeter. Series and parallel combinations of resistors. Ohm's Law. Simple electrical circuits and problems. Magnetic terms; magnetic materials and properties of magnet. Electro magnet, Faradays laws of electro-magnetic induction. Alternating current - vector diagrams. (14 hrs)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Carry out Installation, testing and maintenance of batteries with due care and safety.	33. Practice proper use of different types of cells. (05hrs.) 34. Practice on grouping of cells for specified voltage and current under different conditions and care. (10 Hrs.) 35. Prepare and practice on	Types of cells, advantages/ disadvantages and their applications. Primary cells and secondary cells, Grouping of cells. Charging of battery, care and maintenance. Sealed Maintenance free Batteries. (14 hrs)

		battery charging. (15Hrs.) 36. Practice on routine, care and maintenance of batteries. (10 hrs.) 37. Perform testing of batteries. (10Hrs.)	
Professional Skill 75 Hrs; Professional Knowledge 21 Hrs	Perform wiring, installation of electrical accessories and earthing of electrical equipment.	38. Demonstrate wiring accessories. (05hrs.) 39. Practice on installation and overhauling common electrical accessories. (05hrs.) 40. Fixing of switches, holder plugs etc. in wooden/PVC/ Metallic boards. (15 hrs.) 41. Wire up a test board and test it. (10 hrs.) 42. Practice of various types of electrical circuit connections such as one lamp, two lamp, three lamp with wall socket, stair case wiring, tube light connection etc. (20 hrs.) 43. Wire up two lamps alternatively ON and OFF, bright and dim, godown wiring, railway signal wiring. (20 hrs.)	Common Electrical wiring Accessories, their specifications and B.I.S. Symbols. Diagrams and systems used in domestic wiring. (21 hrs)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Construct small electronic circuits as per drawing using basic electronic components.	44. Determine the resistance by colour coding. (05hrs.) 45. Identify active and passive electronic components. (05hrs.) 46. Identify terminals of different electronic components viz., resistors, diodes, transistors etc. (05hrs.)	**Basic electronics** Semiconductor energy level, atomic structure, types of materials, P-N-junction. Doping, Intrinsic and extrinsic semiconductor, Covalent bond. PN junction diode, Forward and Reverse characteristics. Specification and applications

		47. Verification of characteristics of diode. (05hrs.) 48. Construct and test half wave rectifier circuit. (10hrs.) 49. Construct and test full wave rectifier circuit. (10hrs.) 50. Construct and test bridge rectifier circuit. (10hrs.)	of diodes. Explanation of D.C. rectifier circuit. Half wave, Full wave and Bridge circuit. (14 hrs)
Professional Skill 100 Hrs; Professional Knowledge 28 Hrs	Explain principles and basic process of plating one metal onto another by electrolysis. Use laboratory apparatus and estimate pH, mass, normality, conductivity, specific gravity etc.	51. Identify the laboratory apparatus. (05 hrs.) 52. Verify action of pure and salt water on metals and alloys. (05hrs.) 53. Practice identification of acids and alkalis using litmus paper and other methods. (05 hrs.) 54. Prepare a solution with de ionized water. (05 hrs.) 55. Analyse the reactions of anions (05 hrs.) 56. Analyse the reactions of cations (05 hrs.) 57. Determine the normality and mass per litre of sodium hydroxide, sodium carbonate, potassium hydroxide, hydrochloric acid, sulphuric acid and oxalic acid. (20 hrs.) 58. Estimate the mass of sodium hydroxide, sodium carbonate, potassium hydroxide, hydrochloric acid, sulphuric acid and oxalic acid in a given	Familiarization of laboratory apparatus. Hard and soft water, water for industrial purposes. Technique to convert hard water to soft water. Types of solutions, saturated, unsaturated, super saturated solutions, solubility of solids, distilled and de-ionized water, melting and boiling points. Reactions of anions and cations. Exothermic and endothermic reactions. Qualitative analysis. Reactions of cations and anions. The terms involved in volumetric analysis i.e. Standard solution, normality, titration, titrant, titrate, end point, indicator etc. Principles of volumetric analysis, equivalent masses, normality, molarity, indicators. Acidimetry and alkalimetry. Density and specific gravity. Thermometer and

		solution. (20 hrs.) 59. Measure the specific gravity of liquid sample and check the temperature in degree centigrade and convert to Fahrenheit. (05 hrs.) 60. Determine pH value of different liquids using pH meter. (05hrs.) 61. Study the change in pH of acetic acid on the addition of sodium acetate. (05 hrs.) 62. Determine the conductivity of different liquids using conductivity meter. (05hrs.) 63. Measure boiling point a liquid. (05 Hrs.) 64. Measure melting point of a solid. (05hrs.)	hydrometer. Degree Centigrade, Fahrenheit and its conversion. Definition of pH, pH scale, Chemical effect of electric current, ECE and principle of electrolysis. Faraday's Law of electrolysis. Explanation of Anodes and cathodes. (28 hrs)
Professional Skill 75 Hrs; Professional Knowledge 21 Hrs	Handle different solutions with due care & safety and undertake metal treatment processes and effluent treatment of hazardous chemicals in electroplating workshop. Prepare chemical solutions and undertake cooling, heating, filtering, agitating and other treatments for solutions. Carry out	65. Identify and demonstrate soft water & de-mineralized water. (05 hrs.) 66. Identify and demonstrate various types of corrosions. (05 hrs.) 67. Demonstrate basic safety precautions to be taken while handling different types of electroplating solutions and effluent discharge. (05hrs.) 68. Demonstrate safety precautions to be taken while handling cyanide base electroplating salts and chrome containing effluent. (05hrs.)	Various types of corrosions and importance of protective treatments. Principles and applications of electroplating. General terms and definitions subjected to electroplating. Safety precautions in electroplating shop. First aid and antidotes for chemical poisoning. Exothermic and endothermic reactions. Chemical formulas of different acids, alkalis & cyanides. Properties and Values of ECE for different metals.

	analysis of chemical baths with Hull cell process.	69. Perform effluent treatment of hazardous chemicals in plating shop. (08hrs.) 70. Demonstrate and practice first aid and antidotes for cyanide poisonings. (08 hrs.) 71. Perform setting up of plating tanks and connections. (10hrs.) 72. Determine ECE values of different solutions. (05 hrs.) 73. Practice identification of acids and alkalis using Red/ Blue litmus paper. (05 hrs.) 74. Determine pH value using pH paper and digital pH meter. (05 hrs.) 75. Measure the specific gravity of liquid sample and check the temperature. (06hrs.) 76. Carry out analysis of chemical baths with Hull cell process. (08hrs.)	Precautions to be observed. Method of mixing of electrolyte, use of hydrometer & thermometer. Environmental pollution related to the trade, consequences, mitigation & control. Knowledge about molecular weight, equivalent weight. Hard and soft water, water for industrial purposes. Technique to convert hard water to soft water. Theory involved in the treatment of plating effluent, pollution control, standard rules governing discharge of effluents. Types of solutions, saturated, unsaturated, super saturated solutions, solubility of solids, Analysis of chemical baths with Hull cell process. (21 hrs)
Professional Skill 125 Hrs; Professional Knowledge 35 Hrs	Plan and perform all the various aspects of the plating process including surface preparation, mechanical cleaning like polishing, buffing, blasting etc. and chemical cleaning like electro	77. Identify and demonstrate the equipments used in electroplating shop. (05 hrs.) 78. Demonstrate various polishing wheels and compounds used in surface preparation process. (06 hrs.) 79. Practice cleaning of articles before plating viz., scrubbing with emery	Requirements of a plating shop. Abrasives and Adhesives used for the preparation of wheels. Various compounds used for polishing and buffing. Importance of cleaning, its types, ex. a) Mechanical / chemical. b) Polishing / buffing c) Abrasive cleaning d) Degreasing, pickling, hot

	cleaning, ultrasonic cleaning, vapour degreasing, pickling, rinsing, masking etc.	paper, wet sand, scratch brushes, wire wheel etc. (12 hrs.) 80. Prepare glue and emery wheel binding. (06 hrs.) 81. Practice surface preparation of ferrous/ non ferrous alloys including acid cleaning, polishing, buffing and blast cleaning. (17 hrs.) 82. Prepare suitable dips and pickling for removing of scales from surface of iron and steel. (12 hrs.) 83. Practice in cleaning by means of tumbling barrels. (10 hrs.) 84. Practice ultrasonic cleaning to remove soil from inaccessible places as crevices, blind holes, and gear teeth etc. (06 hrs.) 85. Practice anodic/ cathodic cleaning. (08 hrs.) 86. Practice cleaning of specific metals such as iron, steel, stainless steel, nickel, brass, copper etc. (15 hrs.) 87. Practice degreasing (vapour and immersion) process to include organic solvent i.e. TCE/PCE. (03 hrs.) 88. Practice in using cleaning tanks, preparing suitable solution and methods of masking. (15 hrs.) 89. Practice cleaning of oxidation stains on the	alkaline cleaning& final cleaning. Equivalent weight of compounds, acids, oxide, reduction of acids and stopping off compounds. Chemical cleaning methods by acid dipping, alkaline soak cleaning, vapour degreasing, ultrasonic cleaning, alkaline electro cleaning etc. Different plating techniques for ferrous & non-ferrous metals. General care and maintenance of plating baths, electroplating tank & lining. Various methods of masking. (35 hrs)

		articles of copper, brass, nickel and silver. (10 hrs.)	
Professional Skill 75 Hrs; Professional Knowledge 21 Hrs	Plan and perform Copper plating using different methods, examine various defects, causes and their remedies. Remove defective copper deposit by different methods.	90. Practice setting up of copper plating in acid bath. (10 hrs.) 91. Prepare the acid solution for copper plating. (05 hrs.) 92. Perform copper plating on different ferrous metals from acid bath. (20 hrs.) 93. Practice setting up of copper plating in cyanide bath. (10 hrs.) 94. Prepare the cyanide solution for copper plating. (05 hrs.) 95. Practice and perform electro deposition of copper on different ferrous metals by cyanide solution. (20 hrs.) 96. Practice to remove the defective copper deposit from ferrous metal by immersion and electrolytic methods. (05 hrs.)	Properties of copper, Applications and uses of copper plating in acid bath. Equipments for copper plating in acid bath, Various types of copper solutions in acid type, their compositions and operating conditions, their preparation and maintenance. Processing steps of copper plating in acid bath. Various defects generally encountered in the acid type copper plating, causes for these defects and their remedies Applications and uses of copper plating in cyanide bath. Equipments for copper plating in cyanide bath, Various types of copper solutions in cyanide type, their compositions and operating conditions, their preparation and maintenance. Processing steps of copper plating in cyanide bath. Various defects generally encountered in the cyanide type copper plating, causes for these defects and their remedies. Various methods for the removal of copper deposit. (21 hrs)
Professional	Plan and perform	97. Practice setting up of	Properties of nickel.

Skill 75 Hrs; Professional Knowledge 21 Hrs	Nickel plating using different methods, examine various defects in Nickel plating, causes and their remedies. Remove defective Nickel deposit by different methods.	nickel plating bath. (05 hrs.) 98. Prepare the solution for Nickel plating. (05 hrs.) 99. Perform Nickel plating in articles made of iron. (20 hrs.) 100. Perform Nickel plating in articles made of copper. (15 hrs.) 101. Perform Nickel plating in articles made of brass. (15 hrs.) 102. Practice to remove the defective nickel deposit from different metals by immersion and electrolytic methods. (10 hrs.) 103. Perform carbon treatment and other maintenance of nickel solution. (05 hrs.)	Applications and uses of nickel plating. Equipments for nickel plating, Various types of nickel solutions like dull, bright, black etc, their chemical compositions, operating conditions and their preparation. Importance and maintenance of pH value, density, agitation and filtration. Removal of impurities by carbon treatment and filtration. Processing steps of nickel plating. Various defects generally encountered in the nickel plating, causes for these defects and their remedies Various methods for the removal of nickel deposit from different metals. (21 hrs)
Professional Skill 125 Hrs; Professional Knowledge 35 Hrs	Plan and perform Bright and Hard Chromium plating by different methods on ferrous and non-ferrous metals, examine various defects in Chromium plating, causes and their remedies. Remove the defective Chromium deposit by different	104. Practice setting up of bright chromium plating bath. (10 hrs.) 105. Prepare the solution for bright chromium plating. (05 hrs.) 106. Perform bright chromium plating in articles made of iron. (20 hrs.) 107. Perform bright chromium plating in articles made of copper. (20 hrs.) 108. Practice setting up of hard chromium plating bath. (10 hrs.)	Safety precautions & Exhaust, preventive methods for removing fumes from chromium plating solutions. Applications and uses of bright chromium plating. Equipments for chromium plating, Anodes for chromium plating Regeneration of chromium plating solutions, Proper maintenance, removal of excess sulphate, rectification of trivalent chromium. Various types of bright

	methods.	109. Prepare the solution for hard chromium plating. (05 hrs.) 110. Perform hard chromium plating in articles made of iron. (20 hrs.) 111. Perform hard chromium plating in articles made of copper. (20 hrs.) 112. Practice to remove the defective chromium deposit from different metals by immersion and electrolytic methods. (15 hrs.)	chromium solutions like regular, self regulating and black chromium, their chemical compositions, operating conditions and their preparation. Processing steps of bright chromium plating. Various defects generally encountered in the bright chromium plating, causes for these defects and their remedies. Applications and uses of hard chromium plating. Various types of hard chromium solutions like regular, high speed and self regulating chromium, their chemical compositions, operating conditions and their preparation. Processing steps of hard chromium plating. Various defects generally encountered in the hard chromium plating, causes for these defects and their remedies. Various methods for the removal of chromium deposit from different metals. (35 hrs)
Project work / Industrial visit **Broad Areas:** a) Copper electroplating b) Nickel electroplating c) Bright and hard chromium plating			

SYLLABUS FOR ELECTROPLATER TRADE			
SECOND YEAR			
Duration	**Reference Learning outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 125 Hrs; Professional Knowledge 45 Hrs	Plan and perform Zinc plating using different methods, examine various defects in Zinc plating, causes and their remedies. Remove defective Zinc deposit by different methods.	113. Practice setting up of zinc plating for acid bath. (10 hrs.) 114. Prepare the acid solution for zinc plating. (10 hrs.) 115. Perform zinc plating on different ferrous metals in acid bath and passivate with different colours. (20 hrs.) 116. Perform zinc plating on different non ferrous metals in acid bath and passivate with different colours. (20 hrs.) 117. Practice setting up of zinc plating for cyanide and alkaline zinc bath. (10 hrs.) 118. Prepare the cyanide and alkaline zinc solution for zinc plating. (10 hrs.) 119. Perform zinc plating on different ferrous metals in cyanide and alkaline zinc bath and passivate with different colours. (20 hrs.) 120. Perform zinc plating on different non ferrous metals in cyanide and alkaline zinc bath and passivate with different	Properties of zinc. Applications and uses of zinc plating. Equipments for zinc plating in acid bath. Various types of zinc solutions for acid bath, their compositions and operating conditions, their preparation and maintenance. Processing steps of zinc plating in acid bath. Equipments for zinc plating in cyanide bath. Various types of zinc solutions for cyanide bath, their compositions and operating conditions, their preparation and maintenance. Processing steps of zinc plating In cyanide bath. Various colouring solutions for passivating the zinc deposit. Various defects generally encountered in the zinc plating in acid and cyanide bath, causes for these defects and their remedies Methods for the removal of zinc deposit from various

		colours. (15 hrs.) 121. Practice to remove the defective zinc deposit from various metals by immersion and electrolytic methods. (10 hrs.)	metals. (45 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform Cadmium plating using different methods, examine various defects in Cadmium plating, causes and their remedies. Remove defective Cadmium deposit by different methods.	122. Setting up of cadmium plating bath. (10 hrs.) 123. Prepare the solution for cadmium plating. (05 hrs.) 124. Perform cadmium plating on different ferrous metals and passivate with different colours. (05 hrs.) 125. Perform cadmium plating on different non ferrous metals and passivate with different colours. (20 hrs.) 126. Practice to remove the defective cadmium deposit from various metals by immersion and electrolytic methods. (10 hrs.)	Properties of cadmium. Applications and uses of cadmium plating. Equipments for cadmium plating. Various types of cadmium solutions, their compositions and operating conditions, their preparation and maintenance. Various colouring solutions for passivating the cadmium deposit. Processing steps of cadmium plating. Various defects generally encountered in the cadmium plating, causes for these defects and their remedies Methods for the removal of cadmium deposit from various metals. (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform Tin plating using different methods, examine various defects in Tin plating, causes and their remedies. Remove defective Tin deposit by different methods.	127. Practice setting up of Tin plating bath. (05 hrs.) 128. Prepare the solution for Tin plating. (05 hrs.) 129. Perform Tin plating on different ferrous metals. (15 hrs.) 130. Perform Tin plating on different non ferrous metals. (15 hrs.) 131. Practice to remove the defective Tin deposit	Properties of Tin, Applications and uses of Tin plating. Equipments for Tin plating in acid bath. Various types of Tin solutions for acid bath, their compositions and operating conditions, their preparation and maintenance. Processing steps of Tin plating in acid bath. Equipments for Tin plating in cyanide bath. Various types of

		from various metals by immersion and electrolytic methods. (10 hrs.)	Tin solutions for cyanide bath, their compositions and operating conditions, their preparation and maintenance. Processing steps of Tin plating In cyanide bath. Various defects generally encountered in the Tin plating in acid and cyanide bath, causes for these defects and their remedies Methods for the removal of Tin deposit from various metals. (18 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Plan and perform Silver plating using different methods, examine various defects in Silver plating, causes and their remedies. Remove defective Silver deposit by different methods.	132. Setting up of Silver plating bath. (10 hrs.) 133. Prepare the solution for Silver plating. (05 hrs.) 134. Perform Silver plating on different ferrous metals. (25 hrs.) 135. Perform Silver plating on different non ferrous metals. (25 hrs.) 136. Practice to remove the defective Silver deposit from various metals by immersion and electrolytic methods. (10 hrs.)	Properties of Silver, Applications and uses of Silver plating. Equipments for Silver plating. Various types of Silver solutions, their compositions and operating conditions, their preparation and maintenance. Processing steps of Silver plating. Various defects generally encountered in the Silver plating, causes for these defects and their remedies. Methods for the removal of Silver deposit from various metals. (27 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform Gold plating by different methods, examine various defects in Gold plating, causes and their remedies.	137. Practice setting up of Gold plating bath. (05 hrs.) 138. Prepare the solution for Gold plating. (05 hrs.) 139. Perform Gold plating on different ferrous metals.	Properties of Gold, Applications and uses of Gold plating. Equipments for Gold plating. Various types of Gold solutions, their compositions and operating conditions, their preparation and

	Remove defective Gold deposit by different methods.	(15hrs.) 140. Perform Gold plating on different non ferrous metals. (15hrs.) 141. Practice to remove the defective Gold deposit from various metals by immersion and electrolytic methods. (10 hrs.)	maintenance. Processing steps of Gold plating. Various defects generally encountered in the Gold plating, causes for these defects and their remedies Methods for the removal of Gold deposit from various metals. (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform Brass plating using different methods, examine various defects in Brass plating, causes and their remedies. Remove defective Brass deposit by different methods.	142. Prepare the solution for Brass plating and setting up the bath. (05 hrs.) 143. Perform Brass plating on different ferrous metals. (20hrs.) 144. Perform Brass plating on different non ferrous metals. (20hrs.) 145. Practice to remove the defective Brass deposit from various metals by immersion and electrolytic methods. (05 hrs.)	Properties of Brass, Applications and uses of Brass plating. Equipments for Brass plating. Various types of Brass solutions, their compositions and operating conditions, their preparation and maintenance. Processing steps of Brass plating. Various defects generally encountered in the Brass plating, causes for these defects and their remedies Methods for the removal of Brass deposit from various metals. 918 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Perform Barrel plating method of electroplating for the plating of copper, nickel, tin, zinc and cadmium.	146. Perform copper plating of small articles by barrel method. (10 hrs.) 147. Perform nickel plating of small articles by barrel method. (10 hrs.) 148. Perform tin plating of small articles by barrel method. (10 hrs.) 149. Perform zinc plating of small articles by barrel	Applications of barrel plating in electroplating industry. Types of barrels used for barrelling. Automatic barrel plating plants in the modern industry. Preparation of articles prior to barrel plating. Barrel plating solutions and the operating conditions used for barrel plating of copper, nickel, tin,

		method. (10 hrs.) 150. Perform cadmium plating of small articles by barrel method. (10 hrs.)	zinc and cadmium. General defects, their causes and remedies in barrel plating. (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform electroless plating of copper, nickel, tin, silver and gold.	151. Perform copper plating by electroless method. (10 hrs.) 152. Perform nickel plating by electroless method. (10 hrs.) 153. Perform tin plating by electroless method. (10 hrs.) 154. Perform silver plating by electroless method. (10 hrs.) 155. Perform gold plating by electroless method. (10 hrs.)	Applications of electroless plating in electroplating industry. Preparation of articles prior to electroless plating. Electroless plating solutions and their operating conditions of copper, nickel, tin, silver and gold. General defects, their causes and remedies in electroless plating. (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform plating of copper, tin, nickel, zinc, cadmium etc. on aluminium with Zincate dipping process.	156. Perform copper plating on aluminium articles. (10 hrs.) 157. Perform nickel plating on aluminium articles. (10 hrs.) 158. Perform tin plating on aluminium articles. (10 hrs.) 159. Perform zinc plating on aluminium articles. (10 hrs.) 160. Perform cadmium plating on aluminium articles. (10 hrs.)	Applications of electroplating on aluminium. Preparation of aluminium articles prior to plating. Solution composition, preparation and operating conditions of zincate dipping process. Processing steps of copper, nickel, tin, zinc and cadmium plating on aluminium. General defects, their causes and remedies in plating of aluminium. Removal of copper, nickel, tin, zinc and cadmium deposit from aluminium articles. (18 hrs)
Professional Skill 50 Hrs;	Plan and perform plating of copper,	161. Perform copper plating on ABS plastic. (10 hrs.)	Applications of electroplating on plastic and non conductive

Professional Knowledge 18 Hrs	nickel, chromium, silver and gold on non conductive surface like plastic.	162. Perform nickel plating on ABS plastic. (10 hrs.) 163. Perform chromium plating on ABS plastic. (10 hrs.) 164. Perform silver plating on ABS plastic. (10 hrs.) 165. Perform gold plating on ABS plastic. (10 hrs.)	surfaces. Properties of ABS plastic. Preparation of ABS plastics prior to plating. Solution composition, preparation and operating conditions of plating on plastic processes. Processing steps of copper, nickel, chromium, silver and gold plating on ABS plastic. General defects, their causes and remedies in plating of non conductive surfaces. Removal of coating from ABS plastic surfaces. (18 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Make Printed circuit board with copper, nickel, tin, silver and gold and chemical etching processes for copper and brass.	166. Make Printed circuit board with copper. (10 hrs.) 167. Make Printed circuit board with nickel. (10 hrs.) 168. Make Printed circuit board with tin. (10 hrs.) 169. Make Printed circuit board with silver. (10 hrs.) 170. Make Printed circuit board with gold. (10 hrs.) 171. Make letter printing on copper metal by chemical etching process. (10 hrs.) 172. Make letter printing on brass metal by chemical etching process. (15 hrs.)	Applications printed circuit boards in electronic industry. Types of base materials of PCB. Methods of Layout marking. Immersion copper and etching solutions and operating conditions. Processing steps for making PCB with copper, nickel, tin, silver and gold. General defects, their causes and remedies in making of PCBs. Solution Solution composition, operating conditions and processing steps of brass etching. (27 hrs)
Professional Skill 50 Hrs; Professional Knowledge	Plan and perform Anodizing to convert metal surface into a decorative,	173. Prepare solution for anodizing in sulphuric acid and set up the bath. (05 hrs.) 174. Perform and practice	Properties of aluminium and its corrosion. Applications and uses of anodizing. Preparation of aluminium

18 Hrs	durable and corrosion resistant by different methods. Examine various defects in anodizing, causes and their remedies. Remove the defective anodized film by various methods.	aluminium anodizing in sulphuric acid bath. (10 hrs.) 175. Prepare solution for anodizing in chromic acid and set up the bath. (05 hrs.) 176. Practice anodizing by using chromic acid. (10 hrs.) 177. Prepare solution for anodizing in oxalic acid and set up the bath. (05 hrs.) 178. Practice anodizing by using oxalic acid. (10 hrs.) 179. Practice removal of anodised film from aluminium articles. (05 hrs.)	articles prior to anodizing. Types of anodizing solutions, preparation and operating conditions. Processing steps of anodizing process. Post treatments of anodizing. General defects, their causes and remedies in anodizing of aluminium. Removal of anodized film from aluminium articles. (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform various colouring techniques on anodized aluminium by different colouring dyes and other methods like electro colouring.	180. Prepare solution for various colouring solutions by various colour dye stuffs. (10 hrs.) 181. Practice colouring on anodised aluminium article by using various colouring solutions. (10 hrs.) 182. Prepare solution for electro colouring and setting up the bath. (10 hrs.) 183. Practice electro colouring on anodised aluminium article with various colour shades. (10 hrs.) 184. Remove the colour without attacking the	Applications and uses of anodized colouring. Methods of various colouring techniques. Preparation and operating conditions of various colouring solutions for anodized aluminium articles. Processing steps for colouring. Post treatments of colouring. General defects, their causes and remedies in colouring of anodized parts. Removal of colour film from anodized aluminium articles. (18 hrs)

		anodised film. (10 hrs.)	
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Perform various conversions coating process on aluminium, magnesium and its alloys. Perform chemical milling on aluminium and undertake passivation of stainless steel.	185. Prepare solution for conversion coating on aluminium. (05 hrs.) 186. Practice conversion coating on aluminium and magnesium parts. (10 hrs.) 187. Remove the conversion coating without attacking the base metal. (05 hrs.) 188. Prepare and set up the bath for chemical milling. (05 hrs.) 189. Practice chemical milling on aluminium. (10 hrs.) 190. Prepare solution for stainless steel passivation. (05 hrs.) 191. Practice passivation on stainless steel. (10 hrs.)	Properties and applications for conversion coating. Preparation of solution and operating conditions. Processing steps of conversion coating on aluminium. Removal of conversion coating. Application and uses of chemical milling on aluminium. Preparation of solution and operating conditions. Processing steps of chemical milling on aluminium. Application and uses of passivation on stainless steel. Preparation of solution and operating conditions for passivation on stainless steel. Processing steps for passivation on stainless steel. (18 hrs)
Professional Skill 50 Hrs; Professional Knowledge 18 Hrs	Plan and perform phosphating, powder coating and metallizing on various metals.	192. Prepare the solution and set up for phosphating. (05 hrs.) 193. Perform and practice phosphating on various metals. (10 hrs.) 194. Perform and practice powder coating on various metals. (15 hrs.) 195. Perform and practice metallizing on various metals. (20 hrs.)	Application and uses of phosphating. Types of phosphating solutions. Preparation of solution and operating conditions for phosphating. Processing steps for phosphating. Post treatment for phosphating. Application and uses of powder coating. Equipments for powder coating. Preparation and operating conditions for powder coating. Processing steps and post treatments for powder coating. General care and

			maintenance for powder coating machine. Application and uses of metallizing. Equipments for metallizing. Preparation and operating conditions for metallizing. Processing steps and post treatments for metallizing. General care and maintenance for metallizing machine. (18 hrs)
Professional Skill 75 Hrs; Professional Knowledge 27 Hrs	Perform quality control aspect of the job and ensure electroplated surfaces are free of any flaws or defects. Perform various tests viz., adhesion, porosity, thickness, corrosion resistance, anodic coating on aluminium, chemical analysis of electrolytes and identification of deposits etc.	196. Carry out visual inspection of different electroplated articles for any defects. (05 hrs.) 197. Perform adhesion tests by various methods. (10 hrs.) 198. Perform porosity tests by various methods. (10 hrs.) 199. Perform corrosion resistance tests by various methods. (10 hrs.) 200. Practice in testing different plated jobs for determining the local thickness by various methods. (10 hrs.) 201. Practice in testing different anodised jobs for determining the thickness and insulation. (15hrs.) 202. Practice in analysing different electroplating solutions. (15hrs.)	Quality control in electroplating shops. Inspection of platted surfaces by appearance and to test thickness by using micrometer, BNF jet test methods, ultrasonic thickness tester etc. and to check the adhesion on the base metals by various methods like burnishing test, bend test, lifting test, impact test, grinding wheel test, baking test etc. Various Corrosion resistance tests by using various salt spray tests, corrodekote test, sulphur dioxide test etc. various porosity tests like Hcl test, ferri cyanide test, hot water test, salt spray test, hydrogen peroxide salt test etc. Methods of testing anodic coating on aluminium. Chemical analysis of various plating electrolytes. (21 hrs)
Professional Skill 50 Hrs;	Prepare layout of electroplating	203. Demonstrate Installation of machinery for	Electroplating shop layout, characteristics, factors to be

Professional Knowledge 18 Hrs	plant, estimate cost, materials and accessories required for electroplating shop. Carryout preventive and breakdown maintenance of machines in electroplating shop.	electroplating shops using visual aids. (05 hrs.) 204. Practical study with regards to suitability and selection of equipment for electroplating shops. (05 hrs.) 205. Prepare a complete layout of the electroplating shop with details of plant machineries and technical specifications. (10 hrs.) 206. Working out detailed electroplating layout and calculate the approximate cost of the shop. (10 hrs.) 207. Carry out preventive maintenance of electroplating shops. (05 hrs.) 208. Estimate materials and quantity required for constructing electroplating plant. (15 hrs.)	considered i.e. availability of indigenous materials, waste disposal. Installation of machinery for electroplating shops. Practical study with regards to suitability and selection of equipment, advantages, disadvantages and technical specification. Calculation pertaining to consumption of anodes, estimation materials and quantity required for constructing and etching, plating vats, cleaning etc. Suitability selection of equipments advantages and disadvantages. Calculation of the capacity of the plating vats. (18 hrs)
Project work / Industrial visit Broad Areas: a) Electroless plating b) Plating on aluminium c) Plating on ABS plastic d) Anodizing e) Metal colouring f) Conversion coating g) Plating on PCB h) Etching and chemical milling i) Project report on installation of electroplating shop			