7. TRADE SYLLABUS

SYLLABUS FOR PLASTIC PROCESSING OPERATOR TRADE			
DURATION: ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Check and perform measuring, marking, Hack sawing, filling by using various measuring, marking, cutting and finishing tools following safety precautions.	1. Familiarization with the training institute (workshop visit (02 hrs) 2. Identification to safety equipment & their use etc. (03 hrs) 3. General safety precautions while working in PPO section. (05 hrs) 4. Methods of Housekeeping. (05 hrs) 5. Use fire fighting equipments. (05 hrs) 6. Importance of trade training. (05 hrs)	• Departmental training schemes (CTS/ATS). • Importance of trade. • Importance of safety & Rules. • Classes of fire extinguishers. • Introduction about occupational health hazards followed in plastic industries (07 hrs.)
		7. Perform marking practice straight lines. (03 hrs) 8. Perform hack sawing. (03 hrs) • Fit hacksaw blade to frame. • Use different types of hacksaws frames. 9. Perform filling practice - (straights, cross a draw). (05 hrs) 10. Check flatness. (02 hrs) 11. Check right angle. (02 hrs) 12. Check overall dimensions with vernier calliper. (05 hrs) 13. Check overall dimensions with vernier height gauge. (05 hrs)	• Linear measuring Tools (steal rule) • Hand Tools • Marking Tools • Punching Tools • Sawing Tools • Files • Description Types grades &cut (07 hrs.)

Professional Skill 50Hrs; Professional Knowledge 14 Hrs	Check and perform drilling, tapping, dieing by using different related tools.	**Drilling Practice** 14. Identify of different parts of drilling machine. (01 hr) 15. Fit the tool on drilling machine –(02 hrs) 16. Set the job on machine table with machine vice. (01 hrs) 17. Perform drilled hole. (01 hr) 18. Perform blind hole. (01 hr) 19. Perform counter sunked hole. (01 hr) 20. Perform counter boring hole. (01 hr) 21. Perform spot facing with drilling machine. (01 hr) 22. Inspect hole diameters with the help of vernier caliper. (02 hrs) **Tapping practice** 23. Illustrate tapping tools (Tap set and Tap wrench). (02 hrs) 24. Perform tapping practice with Tap set. (15 hrs) **Dieing practice** 25. Illustrate dieing Tools (Die & Diestock). (01 hr) 26. Perform dieing practice with Die. (15 hrs) 27. Inspect outside diameters with the help of outside micrometer. (06 hrs)	• Drilling machine and its types • Drilling machines its parts and functions • Types of drill • Operation Done of Drilling machine • Tool's used in internal threading Tap &Tap wrench • Tools used in external threading Die& Diestock • Introduction to precision measuring instruments • Vernier caliper • Micrometer • Height gauge • Bevel protector • Least count calculation and it's measurements • Locking devices. (14 hrs.)
Professional Skill 25Hrs; Professional Knowledge 07Hrs	Test and Perform basic electrical earthings with the accessories fittings on board.	28. Perform circuits (close open short). (02 hrs) 29. Verify Ohm's law. (05 hrs) 30. Perform series circuits. (03 hrs) 31. Perform parallel circuits. (03 hrs)	• Definition of Electrical Quantities and its Units • Ohm's law • Types of circuits and its connections • Types of Fuses • Types of Earthing

		32. Perform compound circuits. (02 hrs) 33. Do earthing & test. (05 hrs) 34. Fix the accessories one electric board. (05 hrs) *Need to understand on basic electric safety	• Wire & cable • Electric Symbol's (07 hrs.)
Professional Skill 50Hrs; Professional Knowledge 14 Hrs	Identify different plastic materials and test the properties of material by using various test apparatus.	35. Identify plastic (Thermoplastic / Thermoset). (15 hrs) 36. Perform MFI Test. (15 hrs) 37. Perform Tensile Testing. (02 hrs) 38. Perform Compression Test. (02 hrs) 39. Perform Shear test. (02 hrs) 40. Perform Hardness Test. (02 hrs) 41. Perform Melting point Test. (02 hrs) 42. Perform Impact Test. (02 hrs) 43. Perform Cup flow Testing. (02 hrs) 44. Perform Water absorption Testing. (02 hrs) 45. Perform Haze, gloss testing. (02 hrs) 46. Perform Dart impact Testing. (02 hrs)	• Introduction of plastic • Group of plastic • Properties and used of • Thermoplastic materials * PE *PP * PVC * PMMA * SAN* PC* Nylon * PET. • Properties and Uses of Thermosetting materials *PF* UF* MF* EPOXY* Polyester resin (SMC/DMC) • Identification of plastic. • Commodity, Engineering, Speciality (14 hrs.)
Professional Skill 50Hrs; Professional Knowledge 14 Hrs	Identify, set and produce good quality of injection moulding items and check the defects.	**INJECTION MOULDING** 47. Identify different parts of Hand injection moulding machine. (02 hrs) 48. Perform Mould setting. (03 hrs) • Loading • Perform mould • Loading mould cooling connection	• Different processing techniques • Classification of Injection moulding machine • Hand injection moulding machine parts and function • Injection moulding cycle • Moulds used in hand injection moulding

		• Purging of screw and bearing • Pre-drying requirement 49. Set Temperature. (02 hrs) 50. Perform IRO. (03 hrs) 51. Perform TRO - Single cavity mould. (05 hrs) 52. Perform TRO- Double cavity mould. (05 hrs) 53. Do preventive maintenance of Hand injection moulding machine. (05 hrs)	machine and its terms • Faults, causes and its remedies in hand injection moulding process. Basic knowledge of mould • Core • Cavity • Cooling channel • Ejection system • Runner • Gate (07 hrs.)
		54. Identify of different parts of Automatic injection moulding machine (parts & function). (03 hrs) 55. Perform Mould setting. (05 hrs) 56. Read and set the pressure gauges. (05 hrs) 57. Read and set temperature. (02 hrs) 58. Perform IRO- (start-up, cycle and shutdown procedure). (02 hrs) 59. Perform TRO- single cavity / double cavity mould. (03 hrs) 60. Inspect quality (visuals). (02hrs) 61. Do preventive maintenance of auto injection moulding machine. (03 hrs)	• Auto injection moulding machine its parts and functions • Screw type injection moulding machine • Plunger type injection moulding machine • Co-injection • Different type of clamping system • Auto injection moulding machine mould its parts and function • Two plate mould &three plate mould. Hot Runner mould • Processing defects causes and Remedies –(product) • Trouble shooting of injection molding machine. (07 hrs.)
Professional Skill 100Hrs;	Identify, set, maintain and produce good quality of injection	**MICROPROCESSOR CONTROL & PLC INJECTION MOULDING MACHINE.**	• Introduction about microprocessor control and PLC.

Professional Knowledge 28Hrs	moulding items by using automatic injection moulding machine with the application of Microprocessor control and PLC.	62. Identify and list out of microprocessor control process parameters. (02 hrs) 63. Read and study of process parameters. (05 hrs) 64. Perform mould setting. (05 hrs) • Mould loading • Cooling / MTC • Hot runner system • Ejection 65. Perform Injection unit setting. (02 hrs) 66. Perform different pressure setting. (03 hrs) 67. Set the temperature. (02 hrs) 68. Perform IRO. (03 hrs) 69. Set the shot weight. (02 hrs) 70. Perform TRO. (15 hrs) 71. Shoot out troubles of processing. (2hrs) 72. Perform mould unloading - (02 hrs) 73. Perform mould loading. (02 hrs) 74. Housekeeping of mould. (02 hrs) 75. Trouble shooting of machine. (03 hrs)	• Advantage of Microprocessor and PLC • Electrical injection mounding machines. • Basic principles and feature of thermo set injection mounding process • Comparison between conventional injection mounding machine and PLC & microprocessor control injection moulding machine. (14 hrs.)
		Preventive maintenance of injection mounding machine 76. Do over all cleaning. (05hrs) 77. Do PM of electrical accessories. (10 hrs) 78. Do PM of hydraulic accessories - (10 hrs)	• Importance of preventive maintenance • Schedule wise preventive maintenance of injection mounding machine (07 hrs.)

		79. Identify hydraulic component. (05 hrs) 80. Make hydraulic circuits using single acting cylinder, flow control valve, pressure control valve and pump. (10 hrs) 81. Make hydraulic circuits using double acting cylinder, flow control, pressure control valve pump. (10 hrs)	• Introduction about hydraulic system. • Pascal's law. • Different hydraulic component and it function. • Hydraulic symbol's of component. (07 hrs.)
Professional Skill 100Hrs; Professional Knowledge 28Hrs	Produce good quality of compression moulded items and check the defects by using compression mounding machine	82. Identify of different part of the hand compression mounding machine. (04 hrs) 83. Set the temperature on hand compression moulding machine. (04 hrs) 84. Perform mould setting. (02 hrs) 85. Perform TRO - hand compression. (30 hrs) 86. Do preventive maintenance of hand compression. (10 hrs)	• Processing techniques used for thermo set materials • Introducing about compression mounding process • Machinery used for compression mounding process. • Hand compression mounding machine parts and function • Faults causes and remedies of product. (14 hrs.)
		87. Identify of different part of semi- auto compression mounding machine. (02 hrs) 88. Illustrate hydraulic system of compression mounding machine. (02 hrs) 89. Load the mould & set. (10 hrs) 90. Set the temperature. (02 hrs) 91. Perform IRO. (10 hrs) 92. Perform TRO. (20 hrs) 93. Do preventive maintenance of compression mounding machine. (04 hrs)	• Introduction about semi-auto compression mounding machine. • Semi-auto compression mounding machine parts and function. • Heating system used for mould. • Different types of compression mould • Faults, causes, remedies of processing

			• Trouble shooting of compression mounding machine • Introduction about transfer mounding process • Comparison of compression mounding & transfer mounding (14 hrs.)
Professional Skill 50Hrs; Professional Knowledge 14 Hrs	Identify and perform and different FRP processing techniques.	94. Distinguish mould and pattern. (02 hrs) 95. Identify different glass fibres. (02 hrs) 96. List out of different raw materials (chemicals). (02 hrs) 97. Perform TRO - FRP hand layup process. (20 hrs) 98. Perform Trimming and cutting / finishing of product. (10 hrs) 99. Decorate the product. (08 hrs) 100. Housekeeping of mould. (06 hrs)	• Introduction of FRP • Advantage of FRP • Materials used in FRP • Process used for FRP • Details of hand lay up process • Spray up process • Vaccum bag. • Pressure bag. • Hot press / matched metal mounding • Faults, causes remedies • Health hazard associated with processing and fabrication. (14 hrs.)
Professional Skill 50Hrs; Professional Knowledge 14 Hrs	Identify and produce good quality of blow moulding items and inspect the finished product.	101. Identify different parts of hand blow moulding machine. (05 hrs) 102. Set the temperature. (05 hrs) 103. Set the parison. (02 hrs) 104. Operate the hand blow moulding machine (IRO). (05 hrs) 105. Perform hand blow moulding machine (TRO). (15 hrs) 106. Perform mould unloading. (05 hrs) 107. Load the mould and set. (10	• Introduction to blow moulding process. • List the blow moulding techniques. • Explain parts and functions of hand blow moulding machine. • Faults, causes & Remedies of hand blow moulding. (14 hrs.)

		hrs) 108. Do preventive maintenance of hand blow moulding machine. (03 hrs)	
Professional Skill 25Hrs; Professional Knowledge 07Hrs	Perform simple pneumatic circuits.	109. Identify pneumatic components. (05 hrs) 110. Perform pneumatic circuit using pneumatic components (use single acting cylinder). (10 hrs) 111. Perform pneumatic circuits using pneumatic components (use double acting cylinder.). (10 hrs)	• Introduction about pneumatic system. • Different pneumatic component and its function. • Pneumatics symbols of component. (07 hrs.)
Professional Skill 125Hrs; Professional Knowledge 35Hrs	Identify different parts, set and operate the blown film plant.	112. Identify of different parts of the Auto blow molding machine. (10 hrs) 113. Load the mould and set. (05 hrs) 114. Set the temperature. (05 hrs) 115. Perform IRO – auto blow. (10 hrs) 116. Set the parison. (02 hrs) 117. Set the parison wall thickness. (03 hrs) 118. Perform TRO – auto blows. (20 hrs) 119. Unload mould. (04 hrs) 120. Do preventive maintenance of auto blow moulding. (08 hrs) 121. Clean and inspect air compressor. (08 hrs) **Blend required materials as per recipe.** **Understanding for material requirement and planning for material.**	• Auto blow moulding machine parts and functions. • cycle of Auto blow moulding process. • Different types of blow moulds and its nomenclature. • Stretch blow moulding process. • Other blow moulding techniques. (Extrusion stretch blow (injection stretch blow extrusion blow, intermittent blow, injection blow). • Faults, causes remedies of blow moulding. • Preventive maintenance of low moulding machine. • Required PPE (21 hrs.)

		122. Recognize the extruder. (05 hrs) 123. Identify of different parts of the control panels. (05 hrs) 124. Set the processing temperature. (05 hrs) 125. Change the screw PVC to PE. (05 hrs) 126. Clean the breaker plate and change screen packs. (05 hrs) 127. Load the Blown film Die. (05 hrs) 128. Connect the heaters of Blown film Die. (05 hrs) 129. Adjust the screw speed Nip rollers & winding rollers. (05 hrs) 130. Perform TRO – (Blown film). (10 hrs)	• Introduction to extrusion process. • Materials used for extrusion. • Latest extrusion techniques – (multilayer co-extruder, corrugated pipes.) • Extrusion machine its description use different parts & function. • Blown film extrusion. • Fault, causes Remedies of Blown film. (14 hrs.)
Professional Skill 50Hrs; Professional Knowledge 14 Hrs	Operate the pipe plant and produce good quality pipe	131. Unload blown film die. (05 hrs) 132. Load pipe die. (05 hrs) 133. Set the pipe plant. (05 hrs) 134. Change the screw (PE to PVC). (10 hrs) 135. Set the temperature for pipe processing. (05 hrs) 136. Perform TRO – (pipe). (20 hrs)	• PVC compounding and its chemical ingredients • Pipe plant extrusion its units and function • Fault, causes, Remedies of pipe. (14 hrs.)
Professional Skill 100Hrs; Professional Knowledge 28Hrs	Operate the reprocessing plant and produce reprocessed granules.	137. Load the reprocessing die on extruder. (05 hrs) 138. Prepare raw material for reprocessing. (10 hrs) 139. Illustrate the scrap grinder. (05 hrs) 140. Grind the scrap. (10 hrs) 141. Set the processing temperature for reprocessing. (05 hrs)	• Reprocessing of plastic. • Scrap grinder parts & function & its specification. • Identification code Number for different plastics and its use. • Description about extrusion dies & its parts. (14 hrs.)

		142. Perform TRO – (reprocessing of plastic). (15 hrs).	
		143. Do the preventive maintenance of blown film plant. (15 hrs) 144. Do the preventive maintenance of pipe plant. (15 hrs) 145. Do the preventive maintenance of reprocessing plant. (15 hrs) 146. Do the housekeeping of die. (05 hrs)	• Trouble shooting of extruder. • Preventive maintenance of extruder. • Mono filament process. • Wire coating process. • Cast film process. • Calendaring process. (14 hrs.)
Professional Skill 100Hrs; Professional Knowledge 28Hrs	Install and Operate thermoforming machine and identify cycle of thermoforming Produce good quality of thermoforming product and check the defects.	147. Demonstrate the thermoforming machine. (05 hrs) 148. Set the mould. (05 hrs) 149. Set the parameters of the thermoforming machine. (heat timer temperature, cooling system etc). (05 hrs) 150. Perform IRO – thermoforming machine. (10 hrs)	• Introduction thermoforming process. • Thermoforming cycle. • Materials for thermoforming. • Mould materials. • Heating systems. (07 hrs.)
		151. Prepare the raw material as per mould. (Sheet cutting clamping). (06 hrs) **<u>Straight vacuum forming.</u>** 152. Operate and prepare product. (15 hrs) 153. Finish the thermoformed product. (4 hrs)	• List of different forming process. • Straight vacuum forming. • Drape forming. • Match mould forming. • Pressure bubble plug assist forming. (07 hrs.)
		<u>Drape Forming</u> 154. Change the mould for drape forming. (05 hrs)	• Inline thermoforming process • Comparison

		155. Operate and prepare product. (10 hrs) **<u>Matched mould forming</u>** 156. Change and set the mould for matched mould forming. (05 hrs) 157. Operate and prepare product. (20 hrs) 158. Do preventive maintenance of thermoforming machine. (10 hrs)	thermoforming and injection molding process. • Faults, causes & its remedies of thermoforming process. • Importance of preventive maintenance. (14 hrs.)
Professional Skill 25Hrs; Professional Knowledge 07Hrs	Produce good quality of rotomoulding product and check the defects.	159. Identify different types of Rotomoulding machine. (02 hrs) 160. Illustrate the mould. (01 hr) 161. Set the mould. (02 hrs) 162. Prepare the raw material for rotomoulding. (01 hr) 163. Arrange heating system. (01 hrs) 164. Perform TRO – Rotomoulding. (15 hrs) 165. Finish and Decorate product. (01 hrs) 166. Do preventive maintenance of machine. (02 hrs)	• Introduction Rotational moulding process. • Advantage and Disadvantage & limitations of rotomodulding. • Cycle of Rotomoulding. • Rotational moulding equipments. • Faults causes Ramedies of Rotomoulding • Materials of Rotational moulding. (07 hrs.)
Professional Skill 25Hrs; Professional Knowledge 07Hrs	Identify and Perform predrying process using different materials.	167. Illustrate pre-drying equipments. (05 hrs) 168. Set the temperature. (01 hr) 169. Load the material in tray. (02 hrs) 170. Set the parameters and pre-dry the material. (15 hrs) 171. Perform over all maintenance of pre-drying equipment. (02 hrs)	• Importance of pre-drying. • Various pre-drying equipments. • Pre-drying temperature and time for various materials. • Safety observed while operating pre-drying equipment (07 hrs.)
Professional	Carry out different machining operations	172. Illustrate the fabricating methods. (02 hrs)	• Methods of joining & assembly

Skill 25Hrs; Professional Knowledge 07Hrs	on plastic sheets/blocks.	173. Cut the acrylic sheet using acrylic cutter. (10 hrs) 174. Drill the acrylic sheet HDPE Block using hand drill machine. (10 hrs) 175. Perform screwing the acrylic sheet. (03 hrs)	• Buffing & sanding. • Methods of machining of plastics. • Decoration of plastics. (07 hrs.)
Implant training/project **Broad areas:** (i) Prepare a flower pot by using acrylic sheet. (ii) Prepare geometrical solids by using acrylic sheet. (iii) Prepare any one type of mould used in plastic processing (iv) Prepare any model of extrusion plant. (v) Prepare a display chart of pre-drying materials and its temperature.			