

SYLLABUS FOR FOUNDRYMAN 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	Categorize different types of tools, equipment & raw material used in foundry following safety precautions.	<ol style="list-style-type: none"> 1. Importance of trade training, List of tools & Machinery used in the trade.(01 hr) 2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE).(05 hrs) 3. First Aid Method and basic training. (02 hrs) 4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. (02 hrs) 5. Hazard identification and avoidance. (02 hrs) 6. Safety signs for Danger, Warning, caution & personal safety message. (01 hr) 7. Preventive measures for electrical accidents & steps to be taken in such accidents. (02 hrs) 8. Use of Fire extinguishers. (07 hrs) 9. Practice and understand precautions to be followed while working in fitting jobs. (02 hrs) 10. Safe use of tools and 	<p>All necessary guidance to be provided to the newcomers to become familiar with the working of Industrial Training Institute system including store's procedures.</p> <p>Soft skills, its importance and job area after completion of training.</p> <p>Importance of safety and general precautions observed in the in the industry/shop floor.</p> <p>Introduction of First aid. Operation of electrical mains and electrical safety. Introduction of PPEs.</p> <p>Response to emergencies e.g. power failure, fire, and system failure.</p> <p>Importance of housekeeping & good shop floor practices. Introduction to 5S concept & its application.</p> <p>Occupational Safety & Health: Health, Safety and Environment guidelines, legislations & regulations as applicable.</p> <p>Basic understanding on Hot work, confined space work and material handling equipment.</p>

		equipments used in the trade. (01 hr)	(07 hrs.)
		<p>11. Video show of large foundry industries in India.</p> <p>12. PPT show of various tools & equipment used in foundry.</p> <p>13. Identify each and every tools & equipments as per desired specification.</p> <p>14. PPT show of various raw materials used in foundry.</p> <p>15. Identify each raw materials used in foundry. (25 hrs.)</p>	<p>History of Foundry Industries, development of foundry in India.</p> <p>Importance of foundry Industries. Types of foundries, Advantage of metal casting importance of quality and quality awareness.</p> <p>Different tools & equipments used in foundry.</p> <p>Different raw materials used in foundry Industries. (07 hrs.)</p>
<p>Professional Skill 25 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	Prepare sand mix for moulding.	<p>16. Sieve the used sand with the help of riddle & shovel. (06 hrs)</p> <p>17. Sieve the used sand with power riddle. (06 hrs)</p> <p>18. Make Green sand mixture with tempering by shovel. (06 hrs)</p> <p>19. Make green sand mixture with tempering or moisturing by sand muller. (07 hrs)</p>	<p>Specification tools & equipments. Procedure of use of different tools & equipments.</p> <p>Making of green sand mixture.</p> <p>Special casting process definition materials used composition, the process; use advantages and disadvantage of CO₂ process and shell moulding process. (07 hrs.)</p>
<p>Professional Skill 25Hrs;</p> <p>Professional Knowledge 07Hrs</p>	Perform different types of sand testing & find out result.	<p>20. Test moisture content of green sand with the help of moisture trailer or infrared driver. (05 hrs)</p> <p>21. Find out clay content of sand.(05 hrs)</p> <p>22. Find out permeability test of green sand with permeability tester. (05 hrs)</p> <p>23. Find out strength test with universal testing machine. (05 hrs)</p>	<p>Sand testing different methods of moisture content test permeability test, clay content test, strength test, sand grain fineness test, refractories test of moulding sand.</p> <p>Common types of natural & synthetic moulding sand as per IS 3343-1965 properties of moulding sand. (07 hrs.)</p>

		24. Find out grain fineness no. of moulding sand with sieve shaker tester. (05 hrs)	
Professional Skill 75Hrs; Professional Knowledge 21Hrs	Produce green sand moulds by using appropriate hand tools.	25. Ramming practice by open bedded method to obtain desired hardness such as 60, 70, 80, 90 by green hardness tester. (13 hrs)	Ramming procedure of rammer and other tools used in marking mould. Importance of hardness test. (07 hrs.)
		26. Ramming practice in moulding boxes with hand rammers to obtain desired green hardness such as 70, 80, 90 by green hardness tester. (12 hrs)	
		27. Cut channel on rammed boxes with cross section such as square, semi-circular. (07 hrs)	Different types of Gate cutting system with different tools used & repairs of gates.
		28. Cut channel on rammed boxed with cross section such as trapezoid & triangular and finish with cleaner & double ender etc. (08 hrs)	Difference between natural and synthetic moulding sand principle ingredients in moulding sand & their effect on physical properties special additives in moulding sand & their effect unit sand. (07 hrs.)
		29. Prepare unit sand and prepare mould for block such as square, Rectangular and round.(10 hrs)	
		30. Prepare facing and backing sand and simple moulds with top run gates. (12 hrs)	Facing sand, baking sand
		31. Prepare mould with self-leaving core pattern by using parting line gates. (13 hrs)	Composition of various moulding sand. Types of mould-advantage and disadvantage of sand mould and metal mould. Self-Core making procedure. Moulding boxes [As per IS 1280-1958] Crucible [As per IS 1748-1961] (07 hrs.)
Professional	Produce different	32. Prepare green sand mould	Definition of green sand

Skill 200 Hrs; Professional Knowledge 56 Hrs	casting components by different metal with different moulding process and finish the casting as per requirement.	by using split pattern for aluminium casting. Use natural moulding sand melt aluminium in different furnace and pour the same into moulds, fettle aluminium casting. (25 hrs)	Advantage and disadvantage of green sand mould, skin dry sand mould, loam sand mould and cement bonded sand mould. Contraction, operation and maintenance of pit furnace. (07 hrs.)
		33. Level the floor with spirit level and straight edge and prepare open sand mould. (25 hrs)	Moulding process – bench moulding different methods advantages, disadvantages and their application. (07 hrs.)
		34. Prepare bedded in mould without core with parting line gate. (12 hrs) 35. Prepare bedded in mould with core and bottom run gate. (13 hrs)	Moulding process floor moulding. Different methods; advantage and disadvantages and their application machine moulding different types of moulding machines and slinger. (07 hrs.)
		36. Prepare mould with vertical core. (10 hrs) 37. Prepare simple cores and assemble in the mould. (10 hrs) 38. Prepare mould with horizontal core and assemble in the mould. (12 hrs) 39. Prepare chair core and assemble in the mould. (18 hrs)	Core: Uses and types, composition of various cores sand mixtures. Types of core boxes core venting and vein forcing or core-core baking – core making machines. (14 hrs.)
		40. Prepare moulds for copper and copper base alloys melts copper alloy in pit furnace & pour & fettle the casting. (13 hrs) 41. Prepare moulds for copper and copper base alloys melts copper alloy in oil fired furnace & pour & fettle the	Construction: Operation & maintenance of oil fire furnace pattern- pattern materials. Difference between wooden pattern and metal pattern. (07 hrs.)

		casting. (12 hrs)	
		42. Prepare mould with draw back method & false check method. (10 hrs) 43. Prepare dry sand mould with skeleton pattern. (08 hrs) 44. Prepare black wash & coat on mould. (07 hrs)	Pattern – types of patterns- allowance on pattern colouring of pattern as per IS 1513-1959 care & maintenance of patter. Different types of coating on mould cores. (07 hrs.)
		45. Prepare stack mould. (13 hrs) 46. Prepare snap flask mould. (12 hrs)	Gating system. Various types of top run gate part line gate & bottom gate. (07 hrs.)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Produce wooden joint, make pattern and repair defective pattern and boxes.	47. Marking on wood for half lap joint. (03 hrs) 48. Sawing on wood for half lap joint – (12 hrs) 49. Planning on wood for half lap joint. (10 hrs)	Brief description: Specification and use of various wood working hand tools. Types of joints & their application in wood working. (07 hrs.)
		50. Making different types of joints on wood. (09 hrs) 51. Prepare simple pattern. (08 hrs) 52. Repair wooden patterns & core boxes. (08 hrs)	Methods of repairing the pattern & core boxes. Induction hardening of S.G. Iron casting. (07 hrs.)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Prepare mould with loose piece pattern and loose piece core box.	53. Prepare mould with loose piece pattern & core with loose piece core box. (25 hrs)	Prerequisites of gating system. Riser: Feeders & directional solidification chill: chaplets, denseners & exothermic materials. (07 hrs.)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Perform metal working such as marking, sawing, filing, grinding, drilling etc.	54. Metal working – Marking and sawing on straight line – chipping and filing to desired size on different metals. (10 hrs) 55. Grinding the metals to desire size by pedestal grinder and flexible shaft grinder. (10 hrs)	Description, specification and use of common, marking measuring, sawing, chipping and filing instruments used in metal work. Types of grinders – Brief information about other metal cutting equipments. Various types of drill bits and

		56. Drilling on various metals. (05 hrs)	drilling machine. (07 hrs.)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Make casting of aluminum/ magnesium by melting on Induction furnace & identify defects.	57. Prepare induction furnace for charging, prepare charges for charging, operate and melt aluminium/ magnesium and pour aluminium/ magnesium into the mould and identify defects. (25 hrs)	Induction furnace types- construction, operation and maintenance. (07 hrs.)
Professional Skill 125 Hrs; Professional Knowledge 35 Hrs	Prepare mould by different moulding process, make cast iron castings identify defects.	58. Prepare dry sand mould with odd sided pattern and make casting.(10 hrs) 59. Fettle the casting (07 hrs) 60. Find out defect. (08 hrs)	Description of dry sand mould. Brief description types, advantages & disadvantages of die casting, centrifugal casting and ceramic moulding process. (07 hrs.)
		61. Prepare a loam sand mould for pan shape casting. (10 hrs) 62. Prepare a loam sand mould for bell shape casting. (15 hrs)	Slush casting process, continuous casting process, permanent mould casting process; Nishiyama process (by using ferrosilicon powder) common casting defects appearance- causes and remedies- salvaging of casting. (07 hrs.)
		63. Prepare a pit mould on foundry floor. (10 hrs) 64. Prepare a mould with pattern having cover core print, assemble cover core in mould and cast by cast iron. (12 hrs) 65. Find out all defects. (03 hrs)	Slush casting process, continuous casting process, permanent mould casting process; Nishiyama process (by using ferrosilicon powder) common casting defects appearance- causes and remedies- salvaging of casting. (07 hrs.)
		66. Prepare simple CO2 mould.(07 hrs) 67. Prepare simple CO2 core. (08 hrs) 68. Assemble in CO2 mould	Fettling of casting knock out and removal and removal of casting from mould removal of gates & risers; Fins & unwanted projection – surface gleaning

		<p>core.(05 hrs)</p> <p>69. Make a casting by C.I. (02 hrs)</p> <p>70. Fettle the casting. (02 hrs)</p> <p>71. List out casting defects. (01 hrs)</p>	<p>trimming and finishing.</p> <p>Inspection of casting – destructive method – non-destructive materials used in foundry and their grades as per I.S. (07 hrs.)</p>
		<p>72. Prepare mould for setting “Balancing core” and set balanced core in mould with the help of chaplets. (20 hrs)</p> <p>73. Make an aluminium casting using pit furnace. (03 hrs)</p> <p>74. Fettle the casting. (02 hrs)</p>	<p>Binders - Common binders used in foundry and their application and their grades as per I.S. Common “Facing Materials” used in foundry and their application and their grades as per I.S. Casting design functional design, simplification of foundry practice. Metallurgical design, economic consideration. (07 hrs.)</p>
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Make a casting, fettle the casting & calculation yield percentage.	<p>75. Prepare a mould for setting “Hanging core and set hanging core in mould with the help of chaplets”. (15 hrs)</p> <p>76. Make a casting. (05 hrs)</p> <p>77. Fettle the casting.(03 hrs)</p> <p>78. Find out yield percentage. (02 hrs)</p>	<p>Common “Fluxes” used in foundry and their application. Specification (07 hrs.)</p>
		<p>79. Prepare a mould using chills, densers. (20 hrs)</p> <p>80. Make a casting. (04 hrs)</p> <p>81. Show a video chart of ferrous & non-ferrous metals. (01 hr)</p>	<p>Function of chills, densers. Different between ferrous & non-ferrous metals. Physical & mechanical properties of metals. (07 hrs.)</p>
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Prepare complete core by joining half cores.	<p>82. Prepare core halves. (15 hrs)</p> <p>83. Bake the core halves. (05 hrs)</p> <p>84. Join the core valves by different methods. (05 hrs)</p>	<p>Classification of iron ores & its treatments. (07 hrs.)</p>
Professional Skill 125 Hrs;	Make mould by various types of gate to produce	<p>85. Prepare mould with pencil gate. (10 hrs)</p> <p>86. Prepare mould with finger</p>	<p>Different gating system</p> <p>Common cost iron-alloys.</p> <p>Manufacturing process of chilled</p>

Professional Knowledge 35 Hrs	different type of metal casting. Find out defects and visit industry to show different operation for casting making.	gate. (10 hrs) 87. Make casting with aluminium.(05 hrs)	cast iron; S.G. iron and malleable cast iron. (07 hrs.)		
		88. Prepare mould with wedge gate. (10 hrs) 89. Prepare mould with ring gate.(10 hrs) 90. Make casting with copper base alloy. (05 hrs)	Effect of alloying elements for ferrous metals. Iron-carbon-equilibrium diagram of plain carbon steel. Inoculation: Purpose of inoculation. (07 hrs.)		
		91. Prepare mould with branch gate mould with match plate pattern. (15 hrs) 92. Make casting with cast iron.(06 hrs) 93. Fettle the casting. (04 hrs)	Steel manufacturing process classification common steel alloys and use. (07 hrs.)		
		94. Prepare mould with relief sprue gate. (10 hrs) 95. Prepare mould with skim bob gate. (10 hrs) 96. Make a casting with cast iron. (04 hrs) 97. Find out defects. (01 hr)	Advantages of sprue gate & skim bob gates. Wrought iron-manufacturing process- uses. Copper manufacturing process – properties use. (07 hrs.)		
		98. Prepare mould with horn gate [Gear wheel type pattern]. (09 hrs) 99. Prepare mould with stepped gate. (09 hrs) 100. Industrial visit to observe the special casting process machine moulding process, operation of different furnaces sand reconditioning process, inspection of casting, fettling process etc. (07 hrs)	Manufacturing process properties and use of aluminium, tin, zinc, lead etc. Properties of grey iron. Microstructure, fracture, mechanical test-tensile test, hardness test etc. (07 hrs.)		
		101. Prepare mould for extra thick casting with large feeder heads. (18 hrs) 102. Make casting with cast	Manufacturing process of copper base alloys, aluminium base alloys and magnesium base alloys.		
		Professional Skill 25 Hrs;	Make an extra thick casting & finish it.		
		Professional			

Knowledge 07 Hrs		iron.(04 hrs) 103. Fettle the casting. (03 hrs)	Brief information about cupola furnace. (07 hrs.)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Reline & prepare different types of furnaces for melting cast metals.	104. Reline the pit furnace. (10 hrs) 105. Show a video show for operation of blast furnace. (02 hrs) 106. Relining the oil fired furnace. (10 hrs) 107. Charging of oil fired furnace & melt aluminium. (03 hrs)	Brief information about blast furnace, electric furnaces such as arc furnace and induction furnace. Brief information about open hearth furnace, air furnace, paddling furnace and convertors. (07 hrs.)
		108. Reline of ladle. (08 hrs) 109. Pre heat of ladle. (03 hrs) 110. Reline of muffle furnace.(10 hrs) 111. Metal melt by muffle furnace. (04 hrs)	Heat treatment of casting. (07 hrs.)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Make core by using linseed oil & IVP oils.	112. Prepare simple oil sand core by using linseed oil. (15 hrs) 113. Prepare oil sand core by IVP oils. (10 hrs)	Calculation of ferrostatic pressure. Calculation of weight required on a mould. (07 hrs.)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Prepare mould without pattern & with sweep pattern	114. Prepare simple, regular shape mould without pattern (by cutting practice). (08 hrs) 115. Prepare mould by sweep pattern. (08 hrs) 116. Make mould by ram up core. (09 hrs)	Calculation of molten metal required for different size mould (Aluminium, brass, copper, C.I. etc.) (07 hrs.)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Make casting by die casting process & yield percentage of casting.	117. Prepare simple casting by gravity die casting. (22hrs) 118. Calculation yield percentage.(03hrs)	Cost estimate of simple castings of different metals. Low pressure, high pressure, gravity die casting process. (07 hrs.)
Professional Skill 25 Hrs;	Make casting by investment casting	119. Prepare simple casting by investment casting	Foundry mechanization- layout of a small foundry- list of

Professional Knowledge 07 Hrs	process & binder less process.	process.(13hrs) 120. Prepare simple casting with binder less dry sand process. (12hrs)	material handling equipments and their use. (07 hrs.)
<p>Implant training/ project works:</p> <ul style="list-style-type: none"> a) Sand control tests b) Wooden joints c) Gear casting by horn gate d) Make a simple pattern e) Oil sand core f) Investment casting g) Die casting h) Ladle casting i) S.G. iron casting 			