

FOUNDRYMAN

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



SECTOR – PRODUCTION & MANUFACTURING



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

FOUNDRYMAN

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)



Skill India
कौशल भारत - कुशल भारत

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

The DGT sincerely expresses appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum. Special acknowledgement to the following industries/organizations who have contributed valuable inputs in revising the curricula through their expert members:

1. Volkswagan Academy, Pune
2. OCL Ltd. (Dalmia Group), Odisha
3. Bharat Heavy Electricals Ltd., Ranipet, Tamil Nadu
4. TATA Motors, Pune
5. JBM Group, Chennai
6. MTAB Technology (P) Ltd., Chennai
7. Kirloskar Brothers Limited (KBL), Pune

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Co-ordinator for the course: Sh. N. Nath, ADT, CSTARI, Kolkata

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
1.	N. Nath, ADT	CSTARI, Kolkata	Expert
2.	R. N. Manna, T.O.	CSTARI, Kolkata	Expert
3.	Jugal Kishor Biswas, Instructor	Govt. ITI Midnapore West Midnapore	Expert
4.	Damodar Mandal, T.O.	ATI, Kolkata	Expert

कौशल भारत - कुशल भारत

Sl. No.	Topics	Page No.
1.	Background	1-2
2.	Training System	3-7
3.	Job Role	8
4.	NSQF Level Compliance	9
5.	General Information	10
6.	Learning Outcome	11-12
7.	Learning Outcome with Assessment Criteria	13-15
8.	Syllabus	16-19
9.	Syllabus - Core Skill	20-23
	9.1 Core Skill – Workshop Calculation & Science and Engineering Drawing	
	9.2 Core Skill – Employability Skill	
10.	Details of Competencies (On-Job Training)	89-29
11.	List of Trade Tools & Equipment Basic Training - Annexure I	30-35
12.	Format for Internal Assessment -Annexure II	36

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are four categories of apprentices namely; **trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.



Skill India
कौशल भारत - कुशल भारत

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

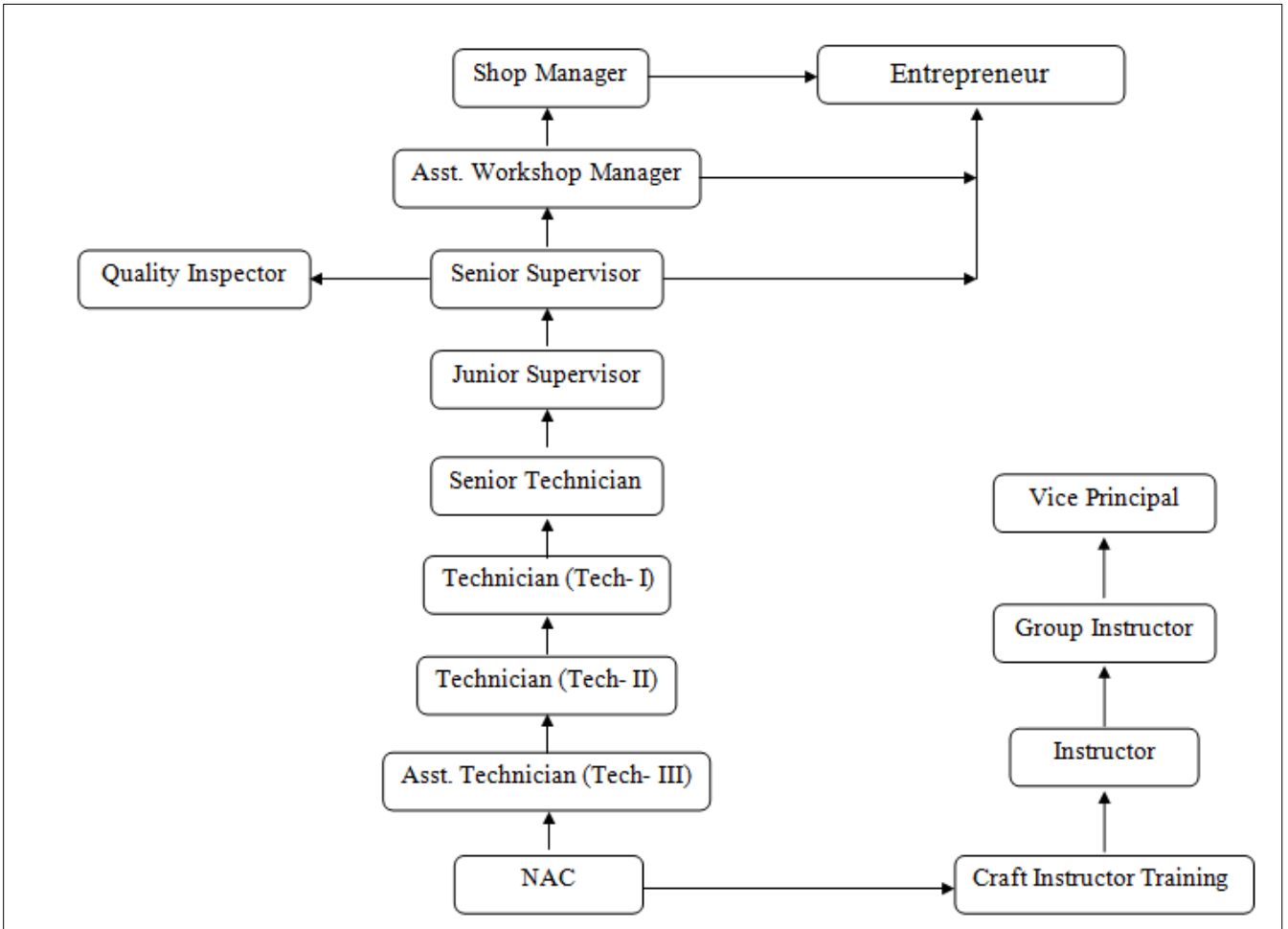
Foundry man trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Understand about the industry safety, material, tools , Equipments , PPE Devices and materials Handling equipments and its Applications.
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations and use their first Aid Kits.
- Understand the concept to Operate and Maintenance the Sand plant, Mould making, Core making, Baking, Backing, Dressing, Assemble, Close and Weigh the mould cavity.
- Select and Choose the material, tools for prepare the furnace operation , Ladle to melt and Pour .
- Understand the Concept of Operate , handle ,and Maintaince the melting Furnace. Select and Choose the Materials, tools , Safety device, for kindle, Charge, slag off, tap moulten metal , Pour, Fettle ,Clean the Casting,
- Check the casting as per drawing for functioning, identify and rectify errors in casting.
- Identify the Casting Defects, and Solve the Defects in castings.,
- Ensure the operate the various material Handling Devices, Pack and Dispatch the castings
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	Block – I	-----	Block – II	-----
Practical Training (On - job training)	----	Block – I	-----	Block – II

Foundryman

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1styr. + 03 months in 2nd yr.)

For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

Sl. No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	For 01 Yr. course
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	1000	500

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The

Foundryman

training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.**

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Foundryman

Performance Level	Evidence
(a) Weight age in the range of 60 -75% to be allotted during assessment	
<p>For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.</p>	<ul style="list-style-type: none"> • Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b) Weight age in the range of above75% - 90% to be allotted during assessment	
<p>For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.</p>	<ul style="list-style-type: none"> • Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weight age in the range of above 90% to be allotted during assessment	
<p>For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.</p>	<ul style="list-style-type: none"> • High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

Brief description of Job roles:

Study of pattern before preparing of mould. Tempers sand properly with binders, additives and moisture. Molder and core makers make moulds and cores for casting metal. Prepare mould from tempered sand using pattern and core box. Places pattern on mould plate. Wooden plate with arrangements to hold pattern. Makes mould in two halves (top and bottom) by ramming foundry sand around pattern. Removes pattern carefully and mends two halves of mould by trowel and smoothers. Makes vent holes by wire for escape of gas and other holes on top box for pouring metal into mould and for escape of excess molten metal (runners and risers).

Fixes dried 'cores' in proper position to have designed holes in casting. May prepare bottom half of mould in floor instead of in bottom box. May dry moulds by fire in case of heavy castings. In production foundry use Machines for preparing moulds. Vertical Pipe prepares mould for vertical casting heavy pipes. Sets bottom socket in molding box (casing) by operating crane hoist. Gets ramming done, removes socket pattern and repairs mould after withdrawal of body pattern. Black washes mould and gets it dried up. Sets socket core at bottom and gets main and top core lowered and placed securely in concentric position. Dressing the mould with refractory dressing materials.

Core Maker, prepares cores with core sand (foundry sand mixed with some bonding agent such as molasses) for casting cavities in metal parts. Sprays ash, silica or other non-adhering powder on sides of core box, partially fills box with core sand, and inserts metal strengthening pins, wires (grid bars). Fills in and compacts more sand until core box is full. Makes vent holes in core with wire. Removes core from core box and drying. Melts metals in cupola (furnace) for making metal castings. Sets furnace bed, lays firewood and ignites. Charges with bed coke, rakes fully ignited coke with long metal pokers to obtain required coke height. Supervises plugging of tuyeres holes, tapping holes, etc. Charges Cupola with required quantity of raw materials scrap, coke, etc. to melt metal to specified temperature.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

Reference NCO: 8121.4700, 7211.0500

NSQF level for Foundryman trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

- a. Process
- b. professional knowledge,
- c. professional skill,
- d. core skill and
- e. Responsibility.



The Broad Learning outcome of Foundryman trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process required	Professional knowledge	Professional skill	Core skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	knowledge of facts, principles, processes and general concepts, in a field of work or study	a range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	FOUNDRY MAN
NCO - 2015	8121.4700, 7211.0500
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months Total duration of Basic Training: 6 months
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months Total duration of Practical Training: 18 months
Entry Qualification	Passed 10 th Class with Science and Mathematics under 10+2 system of Education or its equivalent
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for Basic Training	As per related trades of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for Foundry man Apprenticeship	Foundry man

Note:

- Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.
- For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Foundry man course of 02 years duration under ATS.

Block I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. [{Different mathematical calculation & science Unit & Measurement , Material science ,Mass-Weight &Density, Speed & Velocity, ratio and Proportion, Work power Energy} {Algebra, Heat & Temperature, Simple machine ,Heat treatment Process, Trigonometry, Concept of Pressure}] Interpret specifications, different engineering drawing and apply for different application in the field of work. {Engineering Drawing:, Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections Screw, Rivets and joints , Free hand Sketches for simple pipe line with general fittings. Reading of drawing. Electrical & electronic symbol, Free hand sketch of trade related components / parts /cutting tool indicating angles.}
3. Select and ascertain measuring instrument and measure dimension of components and record data.
4. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
5. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
7. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Prepare different type of molding sand by Manual and sand Muller
2. Carry different types of sand testing
3. Prepare green sand mould with pattern

Foundryman

4. Prepare different types of wooden pattern joints and Pattern
5. Handling of different types of Hand tools
6. Ramming Practice on molding box with hand rammer ,Check with green hardness tester
7. Prepare open and closed mould by using of Facing ,Backing sand with different types of pattern and apply Top run , Parting line run gate.
8. Prepare cupola for melting
9. Operate the cupola
10. Lining the ladle, Tap the molten metal from the cupola and pour the mould cavity.
11. Fettle the casting , and identify the casting defects
12. Prepare the mould by different methods { Follow board mould practice. No bake mould practice. Binder less mould Draw back method , Stack mould }.
13. Prepare core sand and prepare the core by different materials
14. Prepare the mould by different core prints and assemble the core in to the mould cavity.
15. Prepare different types of documentation as per industrial need by different methods of recording information.

Block – II

13. Prepare Dry sand mould for cast iron with odd sided pattern.
14. Prepare Pit mould on foundry floor.
15. Prepare simple "Loam sand mould" for simple pan/bell shape casting
16. Prepare a mould with pattern having cover core print -Assemble cover core in mould cast by cast iron - Fettle C.I. casting
17. Prepare core halves; Bake and join by different methods.
18. Prepare mould with different types gating system and cast it by various metal
19. Prepare CO₂ core sand , Core and mould assemble the mould cavity cast by cast iron
20. Prepare simple oil sand core by using linseed oil and IVP oils
21. Prepare mould with setting of balanced core by Chaplets
22. Prepare mould for using "Chills": Denseners and fix chill and denseners in mould cavity
23. Reline the pit furnace, oil fired furnace, and cupola furnace.
24. Prepare simple casting by gravity die casting process.

NOTE: Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Protective Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, Ratio and proportion , work power Energy , Algebra , heat & temperature, Simple machine , heat

Foundryman

electrical and apply in day to day work. [{Different mathematical calculation & science Unit & Measurement, Material science, Mass-Weight & Density, Speed & Velocity, ratio and Proportion, Work power Energy} {Algebra, Heat & Temperature, Simple machine, Heat treatment Process, Trigonometry, Concept of Pressure}]	treatment process, Trigonometry, Concept of pressure.
	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. [Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections Screw, Rivets and joints , Free hand Sketches for simple pipe line with general fittings. Reading of drawing. Electrical & electronic symbol, Free hand sketch of trade related components / parts /cutting tool indicating angles.]	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, vernier calipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools,	5.1 Explain the concept of productivity and quality tools and apply during execution of job.

Foundryman

and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
<u>Block-I & II</u>	
<p><i>Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under block – I & block – II (section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of Planning (Identify, ascertain, estimate etc.); Execution (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and Checking/ Testing to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other’s work and learning.</i></p>	

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Sieve sand mix and Temper by shovel and sand mixer-Muller Green sand mould with simple bracket pattern.	Types of foundries. Advantages of metal casting.
2	Carry out the different tests such as - moisture content, clay content: strength: permeability & sand grain fineness no. etc. of molding sand.	Sand testing - Different methods of moisture content test; permeability test clay content test - strength test, sand grain fineness test; refractoriness test of molding sand.
3	Wood Working - Marking: sawing and planning on wood. Making important joints on wood and prepare simple pattern	Brief description: specification and use of various wood working hand tools. Types of joints & their application in wood working.
4	Ramming Practice in molding boxes with hand Rammers to obtain desired Green hardness such as 60; 70; 80; 90 on "Green Hardness Tester	Patterns: Pattern materials .Types of pattern, Maintenance of pattern.
5	Open mould and closed mould with simple bracket patterns,	Patterns: colouring of pattern. Pattern allowances. Types of core. Care and maintenance of pattern.
6	Use hand Tools : cut channels on rammed boxes with cross section such as square : semicircular ; Trapezoid and Triangular and finish with double enders ; cleaners etc.	Name: specification and their application of various hand tools used in foundry - common types of natural & synthetic molding sand as per I.S. 3343-1965- properties of molding sand.
7	Prepare unit sand: prepare mould for block such as square, Rectangular & Round. Prepare core.	Difference between natural and Synthetic molding sand-principle ingredients in molding sand & their effect on physical properties-special additives in molding sand & their effect.
8	Prepare facing and Backing sand Prepare simple moulds with Top run gates. Prepare mould with self-leaving core pattern by using parting line gates.	Binders and additives.
9	Prepare Cupola for charging chipping and doubling - prepare metal & slag spout; Tap hole and slag hole; sand bed; Lining	Types of molding sand and there composition.

Foundryman

	of ladle. Prepare charges for cupola charging - operate cupola furnace - melt cast iron & pour C.I. into mould. Prepare skin dry sand mould with irregular parting line. Cast it by C.I. & Identify casting defects.	Crucible furnace and cupola furnace.
10	Follow board mould practice. No bake mould practice. Binder less dry sand mould	No bake system of mould. Shell molding.
11	Prepare moulds with vertical core print. Prepare simple core and assemble in the mould. Prepare simple mould with horizontal core print and assemble the core in horizontal position.	Types of core boxes - core venting and reinforcing of core, core baking, core making machines.
12	Prepare mould with drawback method and Prepare "Stack mould" Loose piece mould.	Venting. Mould Dressing.
13	Revision & Internal Assessment	

NOTE: - More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

Skill India
कौशल भारत - कुशल भारत

BASIC TRAINING (Block – II)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1.	Prepare Dry sand mould for cast iron with odd sided pattern. Prepare simple "Loam sand mould" for simple pan/bell shape casting.	Brief description: types; advantages & disadvantages of 'Die casting' - centrifugal casting .Investment casting processes. Binder less dry sand mold or (Full mould) process
2	Prepare simple CO2 mould. Prepare simple CO2 core; assemble in CO2 mould & cast by cast iron. Prepare simple oil sand core by using linseed oil and IVP oils.	Fettling of casting - knock out and removal of casting from mould- removal of gates and risers; Fins and unwanted projection - surface cleaning -trimming and finishing. Inspection of casting - destructive method - nondestructive methods. Refractory materials used in foundry and their grades as per I.S.
3	Prepare Pit mould on foundry floor. Prepare a mould with pattern having cover core print -Assemble cover core in mould cast by cast iron - Fettle C.I. casting.	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 castings.
4	Prepare mould for setting "Balancing core" and set balance core in mould with the help of chaplets.	CO2 Molding, Gating system. Difference between "Metal and Non-metal" -Difference between ferrous metal and non-ferrous metal. Physical & Mechanical properties of metals.
5	Prepare mould for using "Chills": Denseners and fix chill and denseners in mould.	Iron ore - pretreatments of iron ore - pig iron -manufacturing process - grades as per I.S. and use cast iron - manufacturing process; grades as per I.S. and use.
6	Prepare core halves; Bake and join by different methods.	Common cast iron - Alloy's manufacturing process of chilled cast iron; S.G. iron and malleable cast iron.
7	Prepare mould with "pencil gate"; Finger gate and cast it by Aluminum.	Effect of elements normally present in ferrous metals - effect of alloying elements in ferrous metals - iron carbon equilibrium diagram for plain carbon

Foundryman

		steel. Inoculation: purpose of inoculation.
8	Prepare mould with wedge gate and ring gate and cast it by copper base alloy.	Steel manufacturing process classification -common steel alloys and use. Microstructure of various metals (e.g.,- Grey cast iron, S.G.Iron, steel, Cu-alloys etc.)
9	Prepare mould with Branch gate mould with match plate pattern and cast it by cast iron.	Wrought iron - manufacturing process - use. Copper manufacturing process - properties & uses.
10	Prepare mould with relief sprue gate; skin bob gate and cast it by cast iron.	Brief information about Blast furnace, Electric furnaces such as Arc furnace & Induction furnace.
11	Reline the pit furnace, oil fired furnace.	Brief information about open hearth furnace, Air furnace, Rotary furnace, Paddling furnace and convertors.
12	Reline the cupola furnace. Prepare simple casting by gravity die casting process.	Heat treatment of casting Hardening, Tempering, Annealing, Normalizing, Quenching, Nitriding Cyaniding etc.
13	Revision & Internal Assessment	

NOTE: - More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

Skill India
कौशल भारत - कुशल भारत

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

7.1.1 DETAIL SYLLABUS OF CORE SKILL

A. Block– I
Basic Training

Block – I		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration : - 30 hrs.)
1.	Units & Measurements- FPS, CGS, MKS/SI unit, unit of length, Mass and time. Fundamentals and derived units Conversion of units and applied problems.	Engineering Drawing: Introduction and its importance Different types of standards used in engineering drawing. Drawing Instruments: their uses Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
2.	Material Science : properties - Physical & Mechanical, Types -Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals	Lines : types and applications in Drawing as per BIS SP:46-2003 Drawing geometrical object using all types of lines. Drawing of Geometrical Figures: Angle, Triangle, Square, Rectangle and Circle. Letters: - Lettering styles, Single stroke letters and numbers as per IS standard. Lettering practice
3.	Mass .Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density,	Dimensioning- Types of dimension, elements of dimensions, Methods of indicating Values, Arrangement, Alignment and indication of dimensions. Scales:- Types use and construction. Representative factor of scale.
4.	Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation.	Method of presentation of Engineering Drawing - Pictorial View - Orthogonal View

	Average Velocity, Acceleration & Retardation. Related problems. Circular Motion: Relation between circular motion and Linear motion, Centrifugal force, Centripetal force	- Isometric view
5.	Ratio & Proportion : Simple calculation on related problems. Percentage: Introduction, Simple calculation.	Constructions: - Draw proportionate free hand sketches of plane figures. Sketch horizontal, vertical and inclined line by free hand, Draw circles by free hand using square and radial line method, Draw arcs and ellipse by free hand
6.	Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy. Meaning of H.P., I.H.P., B.H.P., and F.H.P. and CC and Torque.	Projections: Concept of axes plane and quadrant. Orthographic projections Method of first angle and third angle projections (definition and difference) Symbol of 1 st angle and 3 rd angle projection as per IS specification. Free hand Drawing of Orthographic projection from isometric/3D view of geometrical blocks

Block – II		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration : - 30 hrs.)
1.	Algebra: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Screw :- Its Types and Sizes, Screw thread, their standard forms as per BIS, external and internal thread.
2.	Heat & Temperature: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.	Rivets and Joints:- Prepare a drawing sheet on rivets nomenclature and Joints.
3.	Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids - cube, cuboid, cylinder and Sphere. Surface area of solids -cube, cuboid, cylinder and Sphere. Volume of cut-out solids: hollow cylinders, frustum of cone, block section. Volume of simple solid blocks.	Free hand Sketches for simple pipe line with general fittings.
4.	Basic Electricity: Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections - series, parallel, electric power, Horse power, energy, unit of electrical energy. Concept of earthing.	Reading of drawing. Simple exercises related to missing lines, dimensions. How to make queries.
5.	Simple machines Transmission of power: -Transmission of power by belt, pulleys & gear drive. Heat treatment process: - Heat treatment and advantages. Annealing, Normalizing, Hardening, Tempering.	Simple exercises related to trade related symbols. Basic electrical and electronic symbols
6.	Trigonometry:	Free hand sketch of trade related

Foundryman

	<p>Trigonometrical ratios, measurement of angles. Trigonometric tables. Finding the value of unknown sides and angles of a triangle by Trigonometrical method. Finding height and distance by trigonometry. Application of trigonometry in shop problems. (viz. taper angle calculation). Calculate the area of triangle by using trigonometry and application of Pythagoras theorem.</p>	<p>components / parts /cutting tool indicating angles.</p>
7.	<p>Concept of pressure - Definition:- Force, Pressure, and their units, atmospheric pressure, gauges used for measuring pressure, problems. Introduction to pneumatics & hydraulics systems.</p>	



Skill India
कौशल भारत - कुशल भारत

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I (Duration – 55 hrs.)	
1. English Literacy	
Duration : 20 Hrs. Marks : 09	
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy	
Duration : 20 Hrs. Marks : 09	
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information

	Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	
Duration : 15 Hrs. Marks : 07	
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
Block – II	
Duration – 55 hrs.	
4. Entrepreneurship Skills	
Duration : 15 Hrs. Marks : 06	
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.

Foundryman

Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity	
Duration : 10 Hrs. Marks : 05	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education	
Duration : 15 Hrs. Marks : 06	
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	
Duration : 05 Hrs. Marks : 03	
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees

	Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools	
Duration : 10 Hrs.	Marks : 05
Quality Consciousness	Meaning of quality, Quality characteristic
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.



Skill India
कौशल भारत - कुशल भारत

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

A. BLOCK – I (09 months)

1. Safety and best practices/Basic Industrial Culture (5S, KAIZEN, etc.)
2. Prepare different types of documentation as per industrial need by different methods of recording information
3. Sand tempering with binders & additives for preparing of Green sand, Dry sand, loam sand mould etc. and carry out different sand test.
4. Perform wood working and making important wooden joints and identify different types of pattern, core boxes. Repairing defective patterns & core boxes.
5. Identify different types of tools & equipment used in foundry.
6. Select different types of sand like Green sand, Dry sand, Loam sand, backing sand etc. and perform ramming practice, mould making, core making & gating system.
7. Metal melting with pit furnace, oil furnace, cupola furnace, construction & charging of cupola.
8. Perform metal working, marking, sawing, chipping, filling, grinding & drilling.
9. Make different types of mould like- Dry sand mould, Green sand mould, Loam sand mould, pit mould, CO₂ mould Shell mould etc.
10. Making different types of core and setting into the mould and know about the uses of chills gagers etc.
11. Making moulds with different types of gate like pencil gate finger gate, wedge gate etc.
12. Reline of different types of furnaces, ladles and melting practice and making casting.
13. Perform different types of die casting process and investment casting process.
14. Handle various type of Temperature measuring equipment to measure the temperature of liquid metal.
15. Finishing tools and tackles and Modern process of riser cutting breaker.

B. BLOCK – II (09 months)

16. Carry out all tests on moulding sand.
17. Prepare large moulds and core by pit moulding, sweep moulding & by using Skeleton pattern.
18. Prepare mould by special casting process such as Carbon die oxide process shell moulding process Investment casting process, Centrifugal casting process etc.

Foundryman

19. Operate Die casting machine to produce casting.
20. Apply dressing materials to all types of moulds and cores
21. Use chills, chaplets and Denseners for various metals and obtain directional solidification
22. Use different insulating exothermic materials to improve efficiency of riser / feeders
23. Operate all types of moulding machine, core making machine, sand reclamation plant and dust filter etc.
24. Fettle all types of metal by using various types of fettling equipment – Identify casting defects.
25. Carry out all mechanical test by instrument spectrometer etc. on metal casting
26. Prepare the charges for various metals and alloys. Use different types of fuel used in furnace.
27. Select different Refractory materials for various foundry purposes.
28. Use different Fluxes for various metals and Degassing.
29. Maintain and operate different foundry Furnaces such Arc furnace, Induction furnace, Rotary furnace etc.
30. Pour liquid Metal by using various liquid metal handling equipment.
31. Operate all type of core ovens and bake the cores.
32. Identify different types of casting defects and try to reduce the problems.
33. Salvage all metal casting
34. Operate all types of equipments used for Inspection of casting
35. Various types of Heat-treatment process.
36. Reduce dust problem in Foundry Shop.
37. Perform TPM (Total Productive Maintenance), TQM (Total Quality Management) and record keeping system.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

FOUNDRYMAN			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	Name of the Tool & Equipments	Specification	Quantity
1.	Tool tray steel	SS. with rust proof coated 145 x 145 x 5 cm SS. with rust proof coated	21 Nos.
2.	Taper trowel	SS. with rust proof coated Taper 18 cm round edge	21 Nos.
3.	Heart and square trowels	SS. with rust proof coated 3 x 1.2 x 1.2 cm	21 Nos.
4.	Trowel	SS. with rust proof coated Trowel heart and scoop	21 Nos.
5.	Trowel	SS. with rust proof coated Trowel square and scoop	21 Nos.
6.	Trowel	SS. with rust proof coated Trowel double scoop	21 Nos.
7.	Trowel	SS. with rust proof coated Trowel double square	21 Nos.
8.	Tools Spoon	SS. with rust proof coated 32 x 16 mm - 25 x 6 mm	21 Nos.
9.	Cleaner	SS. with rust proof coated 6 x 300 mm	21 Nos.
10.	Cleaner	SS. with rust proof coated 9 x 300 mm	21 Nos.
11.	Vent wire	SS. with rust proof coated 3 x 300 mm	21 Nos.
12.	Peg rammer	Ms base with handle Wedge shaped	21 Nos.
13.	Flat rammer 75mm x 25mm height	Ms base with handle 75mm x 25mm	21 Nos.
14.	Rapping spike forged and hardened	SS. with rust proof coated forged and hardened end 10 x 150 mm	21 Nos.
15.	Hand bellows - 25 cm	Wooden base with leather bellows 25 cm Nozzle	21 Nos.
16.	Safety goggles (with clear glass)	Safety goggles (with clear glass)	21 Nos.
17.	Goggles (antiglau heat proof)	Goggles (antiglau heat proof)	21 Nos.
18.	Cleaner flange	SS. with rust proof coated	21 Nos.
19.	Egg smoother	SS. with rust proof coated	21 Nos.
20.	Smoother round corner	SS. with rust proof coated	21 Nos.
21.	Smoother square corner	SS. with rust proof coated Smoother	21 Nos.

Foundryman

22	Steel rule 300mm	Steel rule 300mm	21 Nos.
23	Apron leather or asbestos	XL or XXL or XXXL	21 Nos.
24	Legging pad	NO. 7,8, 9,10	21 Nos.
25	Hand gloves (Leather or asbestos)	12 , 18, inches	21 Nos.
B : TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS			
26	Hammers Ball Peen	0.45 kg	11
27	Ball peen hammers	650 to 700 gms	11
28	Sledge hammer	8 kg	5
29	Claw hammers	0.75 kg	3
30	Chisel	cold flat 2x22 cm	11
31	Chisel	200x15 mm	11
32	File Flat	30 cm Bastard	11
33	File Flat	30 cm Second cut	11
34	File Half round	half round 30 cm bastard	8
35	File Half round	half round 30 cm second cut	11
36	Folding rule	Four fold 60 cm	5
37	Steel rule	Metric and British 600 mm	5
38	Caliper odd leg	15 cm	3
39	Caliper inside	15 cm	5
40	Scriber	Hardened forged 100 mm	5
41	Centre punch	15 cm	5
42	Hacksaw	30 cm adjustable	11
43	C Clamps	20 cm	11
44	C Clamps	30 cm light duty steel	11
45	Screw driver	25cm width 15mm blade	11
46	Screw driver	15 cm width 8mm blade	11
47	Screw driver	18 cm width 10mm blade	11
48	Pliers	20cm	5
49	Plane grooving	6mm cutter	3
50	Cutting Pliers	20 cm	3
51	Try Square (for wood work)	150 mm	11
52	Brick layers hammer	20cm	11
53	Hand lamp wandering lead		3
54	Degassing bale 10cm perforated hood (Bell plunger rod)	Degassing bale 10cm perforated hood (Bell plunger rod) Fabricated	3
55	Bench vice	12cm jaw Heavy Duty	5
56	Work bench for bench vice	Iron table with wooden Top (245x125x75cm)	11
57	Blow lamp (Kerosene)	Blow lamp for Kerosene 2 pint	5
58	Hand saw	450mm	3
59	Steel measuring tape - 3 meter	Flexible and folding - 3 meter	2

Foundryman

60	Trammel		3
61	Shovel hand	14 inch with wooden Handle	11
62	Engineers try square	15 cm	5
63	Lockers steel	8 drawers	5
64	Black board with easel	Standard size	2
65	Fire buckets	2 for water and 3 for sand cap 10 liters	5
66	Stand for fire buckets	Stand for fire buckets	2
67	Fire extinguisher foam chemical type	Fire extinguisher foam chemical type	3
68	Fire extinguisher	Soda ash, etc type CO2 gas type	1 each
69	Face shield clear	Assorted size	11
70	Helmet (engineers)	Assorted size	11
71	Gauntlets leather fettling	Assorted size	11pairs
72	Gauntlets leather fettling	Assorted size	11pairs
73	Footwear asbestos over shoes	Assorted size	11pairs
74	First Aid Box based on burn treatment	Medicine, Dressing materials as required	1
75	Dividers	Firm joint 20cm	5
76	Molding boxes 30 x 40 x 15 cm RSDL	Molding boxes 30 x 40 x 15 cm RSDL	40 pairs
77	Molding boxes 75 x 75 x 25 cm RSDL	Molding boxes 75 x 75 x 25 cm RSDL	21 pairs
78	Snap flask 40 x 35 x 12 cm RSDL	40 x 35 x 12 cm RSDL	1 pair
79	Snap flask t 30 x 30 x 10 cm RSDL	Snap 30 x 30 x 10 cm RSDL	1 pair
80	Spirit level	300 to 450mm X , Y axes	5
81	Wheel Barrows	Standard	2
82	Weighing machine (cap: 0.001 to 150gm)	Weighing machine (cap: 0.001 to 150gm)	1 no.
C : GENERAL MACHINERY INSTALLATIONS:-			
83	Air Compressor with	Maximum working pressure of 17.5 kg/cm ²	1 no.
84	Pneumatic Rammer with Rubber Rammer head	50MM RAMMING HEAD SUITABLE TO WORKING PRESSURE	1 NO
85	Pneumatic Chisel (with suitable chisel)		1 no.
86	Molding Sand mix cum Muller	35 kg capacity with motor impeller 30 RPM	1 no.
87	Mould Green Hardness Tester	dial type Risdale dials st.	1 no.
88	Core hardness tester		1 no.
89	CO ₂ cylinder with CO ₂ probe and Rubber Hoses with nozzle 12 mm wheel valve.		1 no.
90	LPG Cylinder with heating torch		1 no.
91	Cylinder trolley suitable to CO ₂		1 no.

Foundryman

	cylinder and LP Gas Cylinder		
92	Heating and pumping unit	suit to oil fired tilting type crucible furnace with Heating pressure gauge etc. motorized Rotary gear oil pump pre-heater	1 no.
93	Sand Testing Equipment-permeability meter, Universal Strength tester, Sieve shake, standard sand rammer, Shatter Index Tester, Clay content Tester, Speedy Moisture teller.	Standard specification	1each
94	Molding Machine hand squeeze with stripping device pin lift type.		1 no.
95	Weighing machine	300 kg by 100 g	1 no.
96	Pedestal grinder	DE 35 cm power operated	1 no.
97	Core oven	180 x 90 x 90 cm electric hot air circulated with maximum temperature 350°C adjustable	1 no.
98	Cupola capacity	1.5 tons/hours. Motorized blower and pipe line volume gauge, pressure gauge, charging platform, blast control valve spark arrester.	1 no.
99	Sand Sampler	Standard specification	1 no.
10	Auto Sand riddle	3 tons/hors. ridding capacity	1 no.
10	Sand Aerator	Standard specification	1 no.
10	Oil Fired tilting type crucible furnace	furnace to fit TP no. 100 crucible	1 no.
10	Induction furnace with complete setup	(Cap:50Kg / 50 HZ) suitable for non-ferrous metals	1 no.

Note: In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: FOUNDRYMAN

LIST OF TOOLS& EQUIPMENTS FOR 20 APPRENTICES

1) Space Norms : 45 Sq. m.(For Engineering Drawing)

2) Infrastructure:

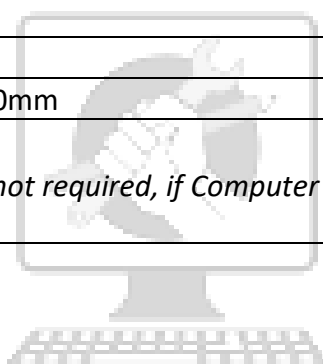
A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Draughtsman drawing instrument box	20 nos.
2.	Set square celluloid 45° (250 X 1.5 mm)	20 nos.
3.	Set square celluloid 30°-60° (250 X 1.5 mm)	20 nos.
4.	Mini drafter	20 nos.
5.	Drawing board (700mm x500 mm) IS: 1444	20 nos.

B : FURNITURE REQUIRED

Sl. No.	Name of the items	Quantity (indicative)
1.	Drawing Board	20 nos.
2.	Models : Solid & cut section	as required
3.	Drawing Table for trainees	as required
4.	Stool for trainees	as required
5.	Cupboard (big)	01
6.	White Board (size: 8ft. x 4ft.)	01
7.	Trainer's Table	01
8.	Trainer's Chair	01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
<p><i>Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.</i></p>		



Skill India
 कौशल भारत - कुशल भारत

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :				Year of Enrollment :										
Name & Address of ITI (Govt./Pvt.) :				Date of Assessment :										
Name & Address of the Industry :				Assessment location: Industry / ITI										
Trade Name :		Semester:		Duration of the Trade/course:										
Learning Outcome:														
Sl. No	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total internal assessment Marks	Result (Y/N)
	Candidate Name	Father's/Mother's Name	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA		
1														
2														