



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

**COMPETENCY BASED CURRICULUM**

# **FOUNDRYMAN**

(Duration: One Year)

**CRAFTSMEN TRAINING SCHEME (CTS)  
NSQF LEVEL- 4**



**SECTOR –PRODUCTION & MANUFACTURING**

# FOUNDRYMAN

(Engineering Trade)

(Revised in 2018)

**CRAFTSMEN TRAINING SCHEME (CTS)**

**NSQF LEVEL - 4**

  
**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 acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

<b>List of Expert members contributed/ participated for finalizing the course curricula of Foundryman trade held on 16.05.17 at Govt. ITI- Aundh, Pune</b>			
S No.	Name & Designation Shri/Mr/Ms	Organization	Remarks
<b>Industry Experts</b>			
1.	Dr. K C Vora, Sr. Dy. Director & Head, Arai Academy	The Automotive Research Association of India, S.No.102, Vetal Hill, Off Paud Road, Kothrud, Pune	Chairman
2.	Jayanta Patra, Sr. Manager	Micromatic Machine Tools (P) Ltd., 240/241, 11th Main, 3rd Phase, Peenya Industrial Area, Bangalore	Member
3.	Kashinath M. Patnasetty, Head - Application Support Group	Ace Designers Ltd. Plot No. 7&8, IIPhase Peenya Industrial Area, Bangalore	Member
4.	Sunil Khodke, Training Manager	Bobst India Pvt. Ltd., Pirangut, Mulashi, Pune	Member
5.	Lokesh Kumar, Manager, Training Academy	Volkswagen India Pvt. Ltd., Pune	Member
6.	Shriram Tatyaba Khaire, Executive Engineering	Sulzer India Pvt. Ltd., Kondhapuri, Shirur, Pune	Member
7.	Milind P Desai, Sr. Shift Engineer	Atlas Copco (I) Ltd Dapodi, Pune	Member
8.	Shrikant Mujumdar, DGM	John Deere India Pvt Ltd. Pune - Nagar Road, Sanaswadi, Pune	Member
9.	G.D. Rajkumar, Director	GTTI, Coimbatore	Member
10.	Milind Sanghai, Team Manager	Alfa Laval India Ltd. Dapodi, Pune	Member
11.	Rajesh Menon, Unit Manager	Alfa Laval India Ltd., Dapodi, Pune	Member
12.	N K A Madhuubalan, DGM - QC, QA & SMPS	Sandvik Asia Pvt. Ltd., Dapodi, Pune	Member
13.	Irkar Balaji, Sr. Engineer Mfg.	Premium Transmission Ltd., Chinchwad, Pune	Member
14.	Rajendra Shelke, Sr. Engineer Mfg.	Premium Transmission Ltd., Chinchwad, Pune - 19	Member
15.	Bhagirath Kulkarni, Manager Maintenance	Tata Ficoso Auto Sys Ltd., Hinjawadi, Pune	Member
16.	Rohan More, Hr & Admin	Tata Ficoso Auto Sys Ltd.,	Member

		Hinjawadi, Pune	
17.	G. Venkateshwaran, TEC Manger- Corporate Responsibility	Cummins India Ltd.	Member
18.	Mahesh Dhokale, Engineer	Tata Toyo Radiator Ltd.	Member
19.	Pankaj Gupta, DGM- HR & IR	Tata Toyo Radiator Ltd.	Member
20.	S K Joshi Head - Business Development	Radheya Machining Ltd., Pune- Nagar Road, Sanaswadi, Pune	Member
21.	A L Kulkarni, DGM Mfg.	PMT Machines Ltd Pimpri, Pune	Member
22.	S V Karkhanis, DGM Planning	PMT Machines Ltd Pimpri, Pune	Member
23.	Kiran Shirsath, Asso. Manager M.E.	Burckhardt Compression Pvt. Ltd., Ranjangaon, Pune	Member
24.	Ajay Dhuri, Manager	Tata Motors Ltd Pimpri, Pune	Member
25.	Arnold Cyril Martin, DGM	Godrej & Boyce Mfg Co Ltd, Mumbai	Member
26.	Ravindra L. More	Mahindra CIE Automotive Ind. Ltd. Ursc- Pune	Member
27.	Kushagra P. Patel	NRB Bearings Ltd., Chiklthana Aurangabad	Member
28.	M. M. Kulkarni, Sr. Manager - Tool room	NRB Bearings Ltd., Chiklthana Aurangabad	Member
<b>DGT &amp; Training Institute</b>			
29.	Nirmalya Nath, Asst. Director of Trg.	CSTARI, Kolkata	Member cum Co-coordinator
30.	Goutam Sutradhar, Prof.	Jadavpore University	Member
31.	Rajib Chaudhuri, Principal	Foundry Cluster Development Association	Member
32.	Damodar Mondal, Trg. Officer	ATI, Howrah	Member
33.	Jugal Kishore Biswas, Instructor	ITI Midnapore	Member

S No.	Topics	Page No.
1.	Course Information	1
2.	Training System	2-5
3.	Job Role	6
4.	General Information	7-8
5.	NSQF Level Compliance	9
6.	Learning/ Assessment Outcome	10-11
7.	Learning Outcome with Assessment Criteria	12-18
8.	Syllabus	19-26
9.	Syllabus - Core Skill	
	9.1 Core Skill – Workshop Calculation & Science and Engineering Drawing	27-30
	9.2 Core Skill – Employability Skill	31-34
10.	Annexure I	
	List of Trade Tools & Equipment	35-38
	List of Tools & Equipment for Employability Skill	39
11.	Annexure II - Format for Internal Assessment	40

## 1. COURSE INFORMATION

---

During the one year duration of Foundryman trade, a candidate is trained on subjects Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Science & Calculation and Employability Skills. In addition to this, a candidate is entrusted to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task.

It broadly covers all aspects of skills required to make casting in foundry industry.

**1<sup>st</sup>Semester**– In this semester, it broadly covers safety aspect in general to safety aspect specific to the trade, identify tools & equipment, raw materials used in casting. Further sand sieving and mixing, sand testing is taught. Other operations like ramming, channel cutting, sand preparation, backing and gate cutting are covered. In addition, core making, preparation of green sand mould, leveling of floor, bedding in mould, preparing mould with different types of core, preparing differing mould as per equipment are also covered. The related wood working different pattern making are also part of the practical task. Different metal working like chipping, filing, grinding, drilling etc. are also covered. Finally, the melting practice on induction furnace is undertaken in this semester.

**2<sup>nd</sup>Semester**– In this semester, preparation of different moulds viz., loam sand mould, pit mould, CO<sub>2</sub>mould and making casting is covered in the beginning. In addition, preparation of mould with different core setting viz., balancing core, hanging core along with casting different metals are covered. Finding the yield percentage is also part of the practical task. Simultaneously preparation of complete core by joining half core is covered. Further, preparation of mould with different gates viz., pencil, finger, wedge ring, branch, relief sprue, skim bob, horn gate, stepped gate etc. including making casting of different metal is covered. Practical skills like relining different furnace viz., fit, oil fired, muffles are covered along with ladle. The preparations of core by linseed oil and ivpoils, preparing mould without pattern are also part of practical skills. Finally, making cast by die & investment casting are covered.

### 2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under the 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.

Foundryman trade under CTS is one of the most popular courses delivered nationwide through a network of ITIs. The course is of one-year (02 semester) 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 science, Engineering Drawing and Employability Skills) imparts requisite core skill, knowledge and life skills. After passing out of the training programme, the trainee is awarded National Trade Certificate (NTC) by NCVT which is recognized worldwide.

**Candidates broadly need to demonstrate that they are able to:**

- Read & interpret technical parameters/documentation, plan work, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

### 2.2 CAREER PROGRESSION PATHWAYS:

- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.

## 2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of one year (02 semesters):

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	1075
2	Professional Knowledge (Trade Theory)	258
3	Workshop Calculation & Science	86
4	Engineering Drawing	129
5	Employability Skills	110
6	Library & Extracurricular Activities	62
7	Project Work	80
8	Revision & Examination	280
	<b>Total</b>	<b>2080</b>

## 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 the Govt. of India from time to time. The employability skills will be tested in first two semesters itself.

- 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 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 NTC will be conducted by NCVT at the end of each semester as per the 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 percentage for Practical is 60% & minimum pass percentage for Theory subjects is 40%. For the purposes of determining the overall result, 50% weightage is applied to the result of each semester examination.



### 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 teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/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:

Performance Level	Evidence
(a) Weightage in the range of 60-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices.	<ul style="list-style-type: none"> <li>• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment.</li> <li>• Below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job.</li> <li>• A fairly good level of neatness and consistency in the finish.</li> <li>• Occasional support in completing the project/job.</li> </ul>
(b) Weightage in the range of 75-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices.	<ul style="list-style-type: none"> <li>• Good skill levels in the use of hand tools, machine tools and workshop equipment.</li> <li>• 70-80% tolerance dimension achieved while undertaking different work with those demanded by the component/job.</li> <li>• A good level of neatness and consistency in the</li> </ul>

	<p>finish.</p> <ul style="list-style-type: none"> <li>• Little support in completing the project/job.</li> </ul>
(c) Weightage 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"> <li>• High skill levels in the use of hand tools, machine tools and workshop equipment.</li> <li>• Above 80% tolerance dimension achieved while undertaking different work with those demanded by the component/job.</li> <li>• A high level of neatness and consistency in the finish.</li> <li>• Minimal or no support in completing the project.</li> </ul>



**Skill India**  
 कौशल भारत - कुशल भारत

Brief description of Job roles:

In Foundryman trade, Mould maker makes mould by hand or machine which is a basic step for making casting metal parts. Mould may be Green sand mould, chemically banded sand (hot box or cold box) mould. Core maker makes core by core box or using machine, for placing inside the mould to have designed holes, undercut or recesses. Metals are melted in different types of furnaces. Different types of treatments are done during melting and pouring of metal inside into the mould. After solidifying, the casting are cleaned and required to improve on machinability, mechanical & metallurgical properties and also relieving internal stresses caused due to process. Executes annealing normalizing and tempering as part of heat treatment.

Foundry charge calculation for cupola, induction and Arc furnaces are necessary to get correct quality of metal considering melting losses.

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

**Reference NCO-2015:**

- (i) 7211.0100
- (ii) 8121.4200
- (iii) 8121.4700
- (iv) 8121.4600

## 4. GENERAL INFORMATION

<b>Name of the Trade</b>	<b>FOUNDRYMAN</b>
<b>NCO - 2015</b>	7211.0100, 8121.4200, 8121.4700, 8121.4600
<b>NSQF Level</b>	Level – 4
<b>Duration of Craftsmen Training</b>	One Year (Two semesters each of six months duration)
<b>Entry Qualification</b>	Passed 10 <sup>th</sup> class under 10+2 System of education
<b>Unit Strength (No. Of Student)</b>	20 (Max. supernumeraries seats: 6)
<b>Space Norms</b>	128 Sq. m
<b>Power Norms</b>	11 KW
<b>Instructors Qualification for</b>	
<b>1. Foundryman Trade</b>	<p>Degree in Mechanical/Metallurgy Engineering/Advanced Diploma in Foundry Technology from recognized university with one year post qualification experience in the relevant field.</p> <p style="text-align: center;"><b>OR</b></p> <p>Diploma in Mechanical/Metallurgy Engineering from a recognized board of technical education with two-year post qualification experience in the relevant field.</p> <p style="text-align: center;"><b>OR</b></p> <p>NTC/NAC passed in "Foundryman" trade with three-year post qualification experience.</p> <p><b>Desirable:</b> Preference will be given to a candidate with CIC (Craft Instructor Certificate) in Foundryman trade.</p> <p><b>Note:</b> <i>Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.</i></p>
<b>2. Workshop Calculation &amp; Science</b>	<p>Degree in Engineering with one year experience.</p> <p style="text-align: center;"><b>OR</b></p> <p>Diploma in Engineering with two-year experience.</p> <p><b>Desirable:</b> Craft Instructor Certificate in RoD&amp;A course under NCVT.</p>
<b>3. Engineering Drawing</b>	Degree in Engineering with one year experience.

	<p style="text-align: center;"><b>OR</b></p> <p>Diploma in Engineering with two-year experience.</p> <p style="text-align: center;"><b>OR</b></p> <p>NTC/ NAC in the Draughtsman (Mechanical) with three-year experience.</p> <p><b>Desirable:</b> Craft Instructor Certificate in RoD&amp;A course under NCVT.</p>					
<b>4. Employability Skill</b>	<p>MBA OR BBA with two-year experience OR Graduate in Sociology/ Social Welfare/ Economics with two-year experience OR Graduate/ Diploma with two-year experience and trained in Employability Skills from DGT institutes.</p> <p style="text-align: center;"><b>AND</b></p> <p>Must have studied English/ Communication Skills and Basic Computer at 12th/ Diploma level and above.</p> <p style="text-align: center;"><b>OR</b></p> <p>Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.</p>					
<b>List of Tools and Equipment</b>	As per Annexure – I					
<b>Distribution of training on hourly basis: (Indicative only)</b>						
Total Hours/Week	Trade Practical	Trade Theory	Work shop Cal. &Sc.	Engg. Drawing	Employability Skills	Extra-curricular Activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours

कौशल भारत - कुशल भारत

## 5. NSQF LEVEL COMPLIANCE

NSQF level for Foundryman trade under CTS: Level 4

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
- e. Responsibility

The broad learning outcome of Foundryman trade under CTS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice.	Factual knowledge of field of knowledge or study.	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts.	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment.	Responsibility for own work and learning.

## **6. LEARNING/ ASSESSABLE OUTCOME**

---

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

### **6.1. GENERIC LEARNING OUTCOME**

The following are minimum broad Common occupational Skills/ Generic Learning Outcome after completion of the Foundryman course of one year duration:

1. Recognize & comply with 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-Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, elasticity*]
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, Different Projections, Assembly drawing, Sectional views, Estimation of material*]
4. Select and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day-to-day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day-to-day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.
8. Plan and execute the work related to the occupation.

### **6.2. SPECIFIC LEARNING OUTCOME**

#### **Semester – I**

9. Categorize different types of tools, equipment & raw material used in foundry.
10. Prepare sand mix for moulding.
11. Perform different types of sand testing & find out result.
12. Produce green sand moulds by using appropriate hand tools.

## ***Foundryman***

13. Produce different casting components by different metal with different moulding process and finish the casting as per requirement.
14. Produce wooden joint, make pattern and repair defective pattern and boxes.
15. Prepare mould with loose piece pattern and loose piece core box.
16. Perform metal working such as marking, sawing, filing, grinding, drilling etc.
17. Make casting of aluminum/ magnesium by melting on Induction furnace & identify defects.

## **Semester – II**

18. Prepare mould by different moulding process, make cast iron castings identify defects.
19. Make a casting, fettler the casting & calculate yield percentage.
20. Prepare complete core by joining half cores.
21. Make mould by various types of gate to produce different type of metal casting. Find out defects & visit industry to show different operation for casting making.
22. Make an extra thick casting & finish it.
23. Reline & prepare different types of furnaces for melting cast metals.
24. Make by using linseed oil & ivpoils.
25. Prepare mould without pattern & with sweep pattern.
26. Make casting by die casting process & yield percentage of casting.
27. Make casting by investment casting process & binder less process.

Skilled India  
कौशल भारत - कुशल भारत



## 7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply with 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 of 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 and 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 and explain different mathematical calculation & science in the field of study including basic electrical. <i>[Different</i>	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, heat & temperature, heat treatment.
	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.

<p><i>mathematical calculation &amp; science-Work, Power &amp; Energy, Algebra, Geometry, Mensuration, Trigonometry, Heat &amp; Temperature, elasticity]</i></p>	2.4 Comply with 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.
<p>3. Interpret specifications, different engineering drawing and apply for different application in the field of work. [<i>Different engineering drawing- Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, Different Projections, Assembly drawing, Sectional views, Estimation of material]</i>]</p>	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 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.
<p>4. Select and measure dimension of components and record data.</p>	4.1 Select appropriate measuring scale/tape/gauges.
	4.2 Measure dimension of the components/assembly & compare with given drawing/measurement.
<p>5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day-to-day work to improve productivity &amp; quality.</p>	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	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.
<p>6. Explain energy conservation, global warming and pollution and contribute in day-to-day work by optimally using available resources.</p>	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available resources optimally & remain sensitive to avoid environmental pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance,	7. 1.Explain personnel finance and entrepreneurship.

entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.	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 familiarize 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 execute 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.Execute the task effectively.



**Skill India**  
 कौशल भारत - कुशल भारत

<b>SPECIFIC LEARNING/ ASSESSABLE OUTCOME</b>	
<b>LEARNING/ ASSESSABLE OUTCOMES</b>	<b>ASSESSMENT CRITERIA</b>
<b>Semester-I</b>	
9. Categorize different types of tools, equipment & raw material used in foundry.	9.1 Select appropriate tools & equipments.
	9.2 Identify raw materials used in foundry.
	9.3 Ensure function of every raw material.
	9.4 Ensure proper use of every tools and equipment.
	9.5 Identify wrong & defective tools & equipments.
10. Prepare sand mix for moulding.	10.1 Plan & identify tools, equipment required for the job.
	10.2 Select raw materials required for preparing sand mix.
	10.3 Prepare the proper mixing of the sand.
	10.4 Check the correct proportion of the mixing sand.
	10.5 Check the moisture content of the mixing sand.
11. Perform different types of sand testing & find out result.	11.1 Identify testing specific equipment for particular test.
	11.2 Check accuracy of the equipments.
	11.3 Perform sand test correctly.
	11.4 Evaluate testing result.
12. Produce green sand moulds by using appropriate hand tools.	12.1 Plan & identify tools & equipments required for producing green sand mould.
	12.2 Select the raw materials, pattern required for making mould & channels.
	12.3 Make necessary mould with the given pattern and cut channel cutting & gate cutting observing standard procedure.
	12.4 Make coating of pattern observing standard procedure.
	12.5 Repair the mould, if necessary.
13. Making different types of core. Produce different casting components by different metal with different moulding process and finish the casting as per requirement.	13.1 Plan & identify proper tools and equipments for making different casting components.
	13.2 Select all raw materials required for the mould, different metal melting.
	13.3 Select pattern for the mould.
	13.4 Make the floor and level it and level checked with spirit level & straight edge.
	13.5 Make the core with the help of core box and assemble the mould with core.
	13.6 Select all charging materials for casting.
	13.7 Prepare the furnace for melting the metal as per type of metal.
	13.8 Pour melting metal into the mould cavity with special

	care. (maintain all safety measure)
	13.9 Fettle the casting carefully.
14. Produce wooden joint, make pattern and repair defective pattern and boxes.	14.1 Plan & identify proper tools for making wooden joint, making pattern and for repair patterns & core boxes.
	14.2 Study the design for the wooden joints.
	14.3 Perform all operations and make the joints.
	14.4 Observe safety procedure during above operations.
	14.5 Check dimensional accuracy as per standard procedure.
	14.6 Avoid waste.
15. Prepare mould with loose piece pattern and loose piece core box.	15.1 Plan & identify proper tools and equipments required.
	15.2 Select loose piece pattern.
	15.3 Select loose piece core box.
	15.4 Select raw material for sand mixer.
	15.5 Mix the sand with write quantity.
	15.6 Make the mould with loose piece pattern.
	15.7 Make core with loose piece core box.
	15.8 Make the mould and assemble it.
	15.9 Observe all step of operation during working.
	15.10 Check correctness of the job.
16. Perform metal working such as marking, sawing, filling, grinding, drilling etc.	16.1 Identify tools & equipments for making sawing, chipping, filling, grinding & drilling.
	16.2 Select appropriate material & the above operation.
	16.3 Perform above operation carefully.
	16.4 Observe safety & precaution during operation.
	16.5 Check the accuracy of the job.
17. Make casting of aluminium/ magnesium by melting on induction furnace & identify defects.	17.1 Observe the safe working of furnace for melting metal.
	17.2 Select raw materials for charging of furnace.
	17.3 Select raw materials for making mould.
	17.4 Select pattern for making mould.
	17.5 Make mould & pour molten metal to the mould.
	17.6 Observe all safety & precaution maintained during metal handling & pouring.
	17.7 Fettled the casting & observe defects.
<b>Semester-II</b>	
18. Make cast iron castings by different moulding process and identify defects.	18.1 Plan & identify proper tools and equipments for making the iron casting.
	18.2 Plan & identify proper tools and equipments for making specific mould.
	18.3 Select all raw materials and prepare mould.
	18.4 Select pattern required for the job.
	18.5 Select core box for making cover core.

	18.6	Make the mould and insert core carefully.
	18.7	Pour the molten metal carefully.
	18.8	Safety should be maintain during handling and pouring of molten metal.
	18.9	Fettle the job.
	18.10	Check the job as per specification.
19. Make a casting, fettle the casting & calculation yield percentage.	19.1	Plan and identify the tools and equipments required for making casting.
	19.2	Check the core box.
	19.3	Select the pattern and check the pattern.
	19.4	Identify raw materials.
	19.5	Make mould and assemble mould.
	19.6	Identify chills & densers.
	19.7	Locate position for chills.
	19.8	Pour molten metal by observing safety.
	19.9	Check the accuracy and quality of the job.
	19.10	Calculate percentage of field.
20. Prepare complete core by joining half cores.	20.1	Identify and check core box for making jobs.
	20.2	Maintain heating temperature of core baking oven.
	20.3	Control the mixed sand composition.
	20.4	Check accuracy of dimensions and hardness of the core.
21. Make mould by various types of gate to produce different type of metal casting and find out defects.	21.1	Plan and identify all hand tools and equipments.
	21.2	Identify all raw materials.
	21.3	Select the pattern and check it.
	21.4	Mix the sand with correct proportion.
	21.5	Maintain Core during meeting.
	21.6	Maintain correct actions during working.
	21.7	Identify defects, if any.
	21.8	Repair the mould, if necessary.
22. Make an extra thick casting & finish it.	22.1	Plan and identify tools and equipments required.
	22.2	Select raw material required for the job.
	22.3	Identify pattern and core box.
	22.4	Mix the moulding sand with correct proportion and quantity.
	22.5	Follow every step for performing mould.
	22.6	Repair mould, if needed.
	22.7	Follow safety rule during carrying molten metal.
	22.8	Find out defect and check quality of the job.
23. Reline & prepare different types of furnaces for melting cast metals.	23.1	Identify tools required for relining and repairing of furnace.
	23.2	Identify raw materials required for reline and repair.

	23.3	Maintain correct proportion of charge materials.
	23.4	Maintain relining thickness.
	23.5	Maintain preheating temperature and heating time.
	23.6	Maintain quality of charge metal for muffle furnace.
	23.7	Maintain all safety and precaution during melting practice.
	23.8	Check quality of casting.
24. Make core by using linseed oil & IVP oils.	24.1	Plan and identify tool requirements.
	24.2	Identify raw materials requirements for the job.
	24.3	Maintain correct ratio for mixing the sand.
	24.4	Check hardness of cores after curing.
	24.5	Check quality and finishing of the core.
25. Prepare mould without pattern & with sweep pattern.	25.1	Plan and identify the tools and equipments required for the mould.
	25.2	Select suitable sweep pattern for sweep moulding.
	25.3	Identify raw materials for the mould.
	25.4	Mix the sand properly.
	25.5	Check dimensions of mould cavity after mould making without pattern.
	25.6	Check the dimension of the mould cavity after mould making by sweep pattern.
26. Make casting by die casting process & yield percentage of casting.	26.1	Identify the machine required for gravity die casting.
	26.2	Ensure the quality of the machine is useable.
	26.3	Observe releasing agent in applied in the metallic dies.
	26.4	Maintain pouring temperature of molten metal.
	26.5	Check the quality of the castings.
	26.6	Calculate yield percentage of casting.
27. Make casting by investment casting process & binder less process.	27.1	Identify raw materials required for making mould.
	27.2	Maintain melting temperature of wax for investment casting.
	27.3	Follow steps of making the mould.
	27.4	Maintain heating temperature for removal of wax from the mould.
	27.5	Extra care for handing the investment mould.
	27.6	Check the quality of the casting.

<b>SYLLABUS FOR FOUNDRYMAN TRADE</b>			
<b>First Semester - 06 Months</b>			
<b>Week No.</b>	<b>Ref. Learning Outcome</b>	<b>Professional Skills (Trade Practical) With Indicative Hours</b>	<b>Professional Knowledge (Trade Theory)</b>
1	Recognize & comply with safe working practices, environment regulation and housekeeping.	<ol style="list-style-type: none"> <li>1. Importance of trade training, List of tools &amp; Machinery used in the trade.(01 hr)</li> <li>2. Safety attitude development of the trainee by educating them to use Personal Protective Equipment (PPE).(05 hrs)</li> <li>3. First Aid Method and basic training. (02 hrs)</li> <li>4. Safe disposal of waste materials like cotton waste, metal chips/burrs etc. (02 hrs)</li> <li>5. Hazard identification and avoidance. (02 hrs)</li> <li>6. Safety signs for Danger, Warning, caution &amp; personal safety message.(01 hr)</li> <li>7. Preventive measures for electrical accidents &amp; steps to be taken in such accidents.(02 hrs)</li> <li>8. Use of Fire extinguishers.(07 hrs)</li> <li>9. Practice and understand precautions to be followed while working in fitting jobs. (02 hrs)</li> <li>10. Safe use of tools and equipments used in the trade. (01 hr)</li> </ol>	<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 &amp; good shop floor practices.</p> <p>Introduction to 5S concept &amp; its application.</p> <p>Occupational Safety &amp; Health: Health, Safety and Environment guidelines, legislations &amp; regulations as applicable.</p> <p>Basic understanding on Hot work, confined space work and material handling equipment.</p>
2	Categorize different types of tools, equipment & raw material used in foundry.	<ol style="list-style-type: none"> <li>11. Video show of large foundry industries in India.</li> <li>12. PPT show of various tools &amp; equipment used in foundry.</li> <li>13. Identify each and every tools &amp; equipments as per desired specification.</li> <li>14. PPT show of various raw materials</li> </ol>	<p>History of Foundry Industries, development of foundry in India.</p> <p>Importance of foundry Industries.</p> <p>Types of foundries, Advantage of metal casting importance of quality and quality awareness.</p> <p>Different tools &amp; equipments used in foundry.</p>



		used in foundry. 15. Identify each raw materials used in foundry.	Different raw materials used in foundry Industries.
3	Prepare sand mix for moulding.	16. Sieve the used sand with the help of riddle & shovel. (06 hrs) 17. Sieve the used sand with power riddle. (06 hrs) 18. Make Green sand mixture with tempering by shovel. (06 hrs) 19. Make green sand mixture with tempering or moisturing by sand muller. (07 hrs)	Specification tools & equipments. Procedure of use of different tools & equipments. Making of green sand mixture. Special casting process definition materials used composition, the process; use advantages and disadvantage of CO <sub>2</sub> process and shell moulding process.
4	Perform different types of sand testing & find out result.	20. Test moisture content of green sand with the help of moisture trailer or infrared driver. (05 hrs) 21. Find out clay content of sand.(05 hrs) 22. Find out permeability test of green sand with permeability tester. (05 hrs) 23. Find out strength test with universal testing machine. (05 hrs) 24. Find out grain fineness no. of moulding sand with sieve shaker tester. (05 hrs)	Sand testing different methods of moisture content test permeability test, clay content test, strength test, sand grain fineness test, refractories test of moulding sand. Common types of natural & synthetic moulding sand as per IS 3343-1965 properties of moulding sand.
5	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) 26. Ramming practice in moulding boxes with hand rammers to obtain desire green hardness such as 70, 80, 90 by green hardness tester. (12 hrs)	Ramming procedure of rammer and other tools used in marking mould. Importance of hardness test.
6	-Do-	27. Cut channel on rammed boxes with cross section such as square, semi-circular.(13 hrs) 28. Cut channel on rammed boxed with cross section such as trapezoid & triangular and finish with cleaner & double ender etc. (12 hrs)	Different types of Gate cutting system with different tools used & repairs of gates.
7	-Do-	29. Prepare unit sand and prepare mould for block such as square, Rectangular and round.(25 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.

8	-Do-	30. Prepare facing and backing sand and simple moulds with top run gates. (25 hrs)	Facing sand, baking sand Composition of various moulding sand. Types of mould- advantage and disadvantage of sand mould and metal mould.
9	-Do-	31. Prepare mould with self-leaving core pattern by using parting line gates. (25 hrs)	Self-Core making procedure. Moulding boxes [As per IS 1280-1958] Crucible [As per IS 1748-1961]
10	Produce different casting components by different metal with different moulding process and finish the casting as per requirement.	32. Prepare green sand mould 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)	Definition of green sand 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.
11	-Do-	33. Level the floor with spirit level and straight edge and prepare open sand mould.	Moulding process – bench moulding different methods advantages, disadvantages and their application.
12	-Do-	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.
13-14	-Do-	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.
15	-Do-	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 casting. (12 hrs)	Construction: Operation & maintenance of oil fire furnace pattern- pattern materials. Difference between wooden pattern and metal pattern.
16	-Do-	42. Prepare mould with draw back method & false check method. (10 hrs) 43. Prepare dry sand mould with	Pattern – types of patterns- allowance on pattern colouring of pattern as per IS 1513-1959 care & maintenance of patter.

		skeleton pattern. (08 hrs) 44. Prepare black wash & coat on mould. (07 hrs)	Different types of coating on mould cores.
17	-Do-	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.
18	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.
19	-Do-	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.
20	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.
21	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) 56. Drilling on various metals. (05 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 drilling machine.
22	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.
23-25	<b>Revision</b>		
26	<b>Examination</b>		

**Note:** More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of welded items like boiler drum, ship building, heavy welded structures etc., may be shown to the trainees to give a feel of Industry and their future assignment.

## SYLLABUS FOR FOUNDRYMAN TRADE

### Second Semester– 06 Months

S No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
27	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.
28	-Do-	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.
29	-Do-	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.
30	-Do-	66. Prepare simple CO <sub>2</sub> mould.(07 hrs) 67. Prepare simple CO <sub>2</sub> core. (08 hrs) 68. Assemble in CO <sub>2</sub> mould core.(05 hrs) 69. Make a casting by C.I. (02 hrs) 70. Fettle the casting. (02 hrs) 71. List out casting defects. (01 hrs)	Fettling of casting knock out and removal and removal of casting from mould removal of gates & risers; Fins & unwanted projection – surface gleaning trimming and finishing. Inspection of casting – destructive method – non-destructive materials used in foundry and their grades as per I.S.
31	-Do-	72. Prepare mould for setting “Balancing core” and set balanced core in mould with the help of chaplets. (20 hrs) 73. Make an aluminium casting using pit furnace. (03 hrs) 74. Fettle the casting. (02 hrs)	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.
32	Make a casting, fettle	75. Prepare a mould for setting	Common “Fluxes” used in

	the casting & calculation yield percentage.	<p>“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>	foundry and their application. Specification
33	-Do-	<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 &amp; non-ferrous metals. (01 hr)</p>	Function of chills, densers. Different between ferrous & non-ferrous metals. Physical & mechanical properties of metals.
34	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>	Classification of iron ores & its treatments.
35	Make mould by various types of gate to produce different type of metal casting. Find out defects and visit industry to show different operation for casting making.	<p>85. Prepare mould with pencil gate. (10 hrs)</p> <p>86. Prepare mould with finger gate. (10 hrs)</p> <p>87. Make casting with aluminium.(05 hrs)</p>	Different gating system Common cost iron-alloys. Manufacturing process of chilled cast iron; S.G. iron and malleable cast iron.
36	-Do-	<p>88. Prepare mould with wedge gate. (10 hrs)</p> <p>89. Prepare mould with ring gate.(10 hrs)</p> <p>90. Make casting with copper base alloy. (05 hrs)</p>	Effect of alloying elements for ferrous metals. Iron-carbon-equilibrium diagram of plain carbon steel. Inoculation: Purpose of inoculation.
37	-Do-	<p>91. Prepare mould with branch gate mould with match plate pattern. (15 hrs)</p> <p>92. Make casting with cast iron.(06 hrs)</p> <p>93. Fettle the casting. (04 hrs)</p>	Steel manufacturing process classification common steel alloys and use.
38	-Do-	<p>94. Prepare mould with relief sprue gate. (10 hrs)</p> <p>95. Prepare mould with skim bob gate. (10 hrs)</p> <p>96. Make a casting with cast iron. (04 hrs)</p> <p>97. Find out defects. (01 hr)</p>	Advantages of sprue gate & skim bob gates. Wrought iron-manufacturing process- uses. Copper manufacturing process – properties use.
39	-Do-	<p>98. Prepare mould with horn gate [Gear wheel type pattern].(09 hrs)</p> <p>99. Prepare mould with stepped gate. (09 hrs)</p>	Manufacturing process properties and use of aluminium, tin, zinc, lead etc. Properties of grey iron. Microstructure, fracture, mechanical test-tensile test,

		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)	hardness test etc.
40	Make an extra thick casting & finish it.	101. Prepare mould for extra thick casting with large feeder heads. (18 hrs) 102. Make casting with cast iron.(04 hrs) 103. Fettle the casting. (03 hrs)	Manufacturing process of copper base alloys, aluminium base alloys and magnesium base alloys. Brief information about cupola furnace.
41	Reline & prepare different types of furnaces for melting cast metals.	104. Reline the pit furnace. (22 hrs) 105. Show a video show for operation of blast furnace. (03 hrs)	Brief information about blast furnace, electric furnaces such as arc furnace and induction furnace.
42	-Do-	106. Relining the oil fired furnace. (20 hrs) 107. Charging of oil fired furnace & melt aluminium. (05 hrs)	Brief information about open hearth furnace, air furnace, paddling furnace and convertors.
43	-Do-	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.
44	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.
45	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.)
46	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.
47	Make casting by investment casting process & binder less process.	119. Prepare simple casting by investment casting process.(13hrs) 120. Prepare simple casting with binder less dry sand process. (12hrs)	Foundry mechanization- layout of a small foundry- list of material handling equipments and their use.

48-49	<b>Implant training/ project works:</b> <ol style="list-style-type: none"> <li>a) Sand control tests</li> <li>b) Wooden joints</li> <li>c) Gear casting by horn gate</li> <li>d) Make a simple pattern</li> <li>e) Oil sand core</li> <li>f) Investment casting</li> <li>g) Die casting</li> <li>h) Ladle casting</li> <li>i) S.G. iron casting</li> </ol>
50-51	<b>Revision</b>
52	<b>Examination</b>

**Note:**

1. Some of the sample project works (indicative only) are given against each semester.
2. Instructor may design their own project and also inputs from local industry may be taken for designing such new projects.
3. The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit Project report.
4. If the instructor feels that for execution of specific project more time is required than he may plan accordingly to produce components/ sub-assemblies in appropriate time i.e., may be in the previous semester or during execution of normal trade practical.

कौशल भारत - कुशल भारत

## 9. SYLLABUS - CORE SKILLS

### 9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING:

First Semester Duration: Six Months		
S No.	Workshop Calculation and Science	Engineering Drawing
1.	<b>Unit:</b> Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance <ul style="list-style-type: none"> <li>- Relationship to other technical drawing types</li> <li>- Conventions</li> <li>- Viewing of engineering drawing sheets</li> <li>- Method of Folding of printed Drawing Sheet as per BIS SP:46-2003</li> </ul>
2.	<b>Fractions:</b> Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Drawing Instruments: their Standard and uses <ul style="list-style-type: none"> <li>- 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.</li> </ul>
3.	<b>Ratio &amp; Proportion:</b> Simple calculation on related problems.	Lines: <ul style="list-style-type: none"> <li>- Definition, types and applications in Drawing as per BIS SP:46-2003</li> <li>- Classification of lines (Hidden, centre, construction, Extension, Dimension, Section)</li> <li>- Drawing lines of given length (Straight, curved)</li> <li>- Drawing of parallel lines, perpendicular line</li> <li>- Methods of Division of line segment</li> </ul>
4.	<b>Percentage:</b> Introduction, Simple calculation.  Changing percentage to fraction and decimal & vice-versa.	Free hand drawing of <ul style="list-style-type: none"> <li>- Lines, polygons, ellipse, etc.</li> <li>- geometrical figures and blocks with dimension</li> </ul> Transferring measurement from the given



		object to the free hand sketches.
5.	<p><b>Material Science:</b> Properties -Physical &amp; Mechanical, Types –Ferrous &amp; Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.</p>	<p>Lettering and Numbering as per BIS SP46-2003:</p> <ul style="list-style-type: none"> <li>- Single Stroke, Double Stroke, inclined, Upper case and Lower case.</li> </ul>
6.	<p><b>Mass, Weight and Density:</b> Mass, Unit of Mass, Weight, difference between mass and weight.</p> <p>Density, unit of density. Relation between mass, weight &amp; density.</p> <p>Simple problems related to mass, weight, and density.</p>	<p>Drawing of Geometrical Figures: Definition, nomenclature and practice of :</p> <ul style="list-style-type: none"> <li>- Angle: Measurement and its types, method of bisecting.</li> <li>- Triangle-different types</li> <li>- Rectangle, Square, Rhombus, Parallelogram.</li> <li>- Circle and its elements.</li> </ul>
7.	<p><b>Work, Power and Energy:</b> 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.</p>	<p>Sizes and Layout of Drawing Sheets</p> <ul style="list-style-type: none"> <li>- Basic principle of Sheet Size</li> <li>- Designation of sizes</li> <li>- Selection of sizes</li> <li>- Title Block, its position and content</li> <li>- Borders and Frames (Orientation marks and graduations)</li> <li>- Grid Reference</li> <li>- Item Reference on Drawing Sheet (Item List)</li> </ul>
8.	-----	<p>Method of presentation of Engineering Drawing</p> <ul style="list-style-type: none"> <li>- Pictorial View</li> <li>- Orthographic View</li> <li>- Isometric view</li> </ul>
9.	-----	<p>Symbolic Representation used in the related trade (as per BIS SP:46-2003) of:</p> <ul style="list-style-type: none"> <li>- Fastener (Rivets, Bolts and Nuts)</li> <li>- Bars and profile sections</li> <li>- Weld brazed and soldered joints</li> <li>- Electrical and electronics element</li> <li>- Piping joints and fittings</li> </ul>

<b>Second Semester</b> <b>Duration: Six Months</b>		
S No.	Workshop Calculation and Science	Engineering Drawing
1.	<p><b>Basic Algebra:</b>            Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).</p>	<p><b>Dimensioning practice:</b></p> <ul style="list-style-type: none"> <li>- Position of dimensioning (unidirectional, aligned, as per BIS SP:46-2003)</li> <li>- Types of arrowhead</li> <li>- Leader Line with text</li> <li>- Symbols preceding the value of dimension and dimensional tolerance.</li> </ul>
2.	<p><b>Mensuration:</b>            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.</p>	<p>Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid) with dimensions.</p>
3.	<p><b>Trigonometry:</b> Trigonometrical ratios, measurement of angles.             Trigonometric tables</p>	<p>Free hand Drawing of Solid figures (Prism, Pyramid, Frustum of Cone and Pyramid) with dimensions.</p>
4.	<p><b>Elasticity:</b>            Elastic &amp; Plastic material. Stress &amp; strain and their units. Young's modules. Ultimate stress and breaking stress.</p>	<p>Free Hand sketch of hand tools and measuring tools used in respective trades.</p>
5.	<p><b>Heat &amp; Temperature:</b>            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.</p>	<p><b>Projections:</b></p> <ul style="list-style-type: none"> <li>- Concept of axes plane and quadrant.</li> <li>- Orthographic projections</li> <li>- Method of first angle and third angle projections (definition and difference)</li> <li>- Symbol of 1<sup>st</sup> angle and 3<sup>rd</sup> angle projection as per IS specification.</li> </ul>
6.	<p><b>Basic Electricity:</b> Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their</p>	<p>Drawing of Orthographic projection in 3<sup>rd</sup> angle.</p>

	<p>units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy.</p> <p>- Electrical insulating materials. - Basic concept of earthing.</p>	
<b>7.</b>	<p>- Area of irregular surfaces. - Application related to shop problems.</p>	Free hand Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
<b>8.</b>	<p>- Material weight and cost problems related to trade.</p>	Free hand sketching of simple objects related to trade.
<b>9.</b>	<p>- Temperature measuring instruments. Specific heats of solids &amp; liquids.</p>	- Riveted joints-Butt & Lap (Drawing one for each type).
<b>10.</b>	<p>- Thermal Conductivity, Heat loss and heat gain.</p>	- Reading of drawing. Simple exercises related to missing lines, dimensions. How to make queries.
<b>11.</b>	<p>- Heat treatment and advantages.</p>	<p>- Simple exercises relating missing symbols. - Missing views</p>
<b>12.</b>	<p>-----</p>	- Concept of preparation of assembly drawing and detailing. Preparation of simple assemblies & their details of trade related job/exercises with the dimensions from the given sample or models.
<b>13.</b>	<p>-----</p>	Reading of fabricated engineering drawing

**9.2 EMPLOYABILITY SKILLS:(110 Hours)**

<b>CORE SKILL – EMPLOYABILITY SKILL</b>	
<b>First Semester</b>	
<b>1. English Literacy</b>	
<b>Duration : 20 hrs</b>	
<b>Marks : 09</b>	
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 known people, picture reading, gain confidence through role- playing and discussions on current happenings, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing on messages and filling in message forms, greeting and introductions, office hospitality, resumes or curriculum vitae's essential parts, letters of application reference to previous communication.
<b>2. IT Literacy</b>	
<b>Duration : 20 hrs</b>	
<b>Marks : 09</b>	
Basics of Computer	Introduction, computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down computer.
Computer Operating System	Basics of Operating System, WINDOWS, 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 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),

	<p>Meaning of World Wide Web (WWW), Web browser, Website, 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.</p> <p>Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.</p>
<p><b>3. Communication Skills</b></p>	
<p><b>Duration : 15 hrs</b> <b>Marks : 07</b></p>	
Introduction to Communication Skills	<p>Communication and its importance</p> <p>Principles of Effective communication</p> <p>Types of communication - verbal, non-verbal, written, email, talking on phone.</p> <p>Non-verbal communication- characteristics, components-Para-language</p> <p>Body language</p> <p>Barriers to communication and dealing with barriers.</p> <p>Handling nervousness/discomfort.</p>
Listening Skills	<p>Listening-hearing and listening, effective listening, barriers to effective listening, guidelines for effective listening.</p> <p>Triple- A Listening - Attitude, Attention &amp; Adjustment.</p> <p>Active listening skills.</p>
Motivational Training	<p>Characteristics essential to achieving success.</p> <p>The power of positive attitude.</p> <p>Self-awareness</p> <p>Importance of commitment.</p> <p>Ethics and values</p> <p>Ways to motivate oneself.</p> <p>Personal goal setting and employability planning.</p>
Facing Interviews	<p>Manners, etiquettes, dress code for an interview.</p> <p>Do's &amp; Don'ts for an interview.</p>
Behavioral Skills	<p>Problem solving, confidence building, attitude.</p>
<p><b>Second Semester</b></p>	
<p><b>4. Entrepreneurship Skills</b></p>	
<p><b>Duration : 15 hrs</b> <b>Marks : 06</b></p>	
Concept of Entrepreneurship	<p>Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue</p> <p>Entrepreneurship vs. management, Entrepreneurial motivation.</p> <p>Performance &amp; Record, Role &amp; Function of entrepreneurs in relation to the enterprise &amp; relation to the economy, Source of business ideas, Entrepreneurial opportunities, and the process of setting up a business.</p>

Project Preparation & Marketing Analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution management. Difference between small scale & large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's 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 familiarize with the Policies/ Programmes, procedure & the available scheme.
Investment Procurement	Project formation, feasibility, Legal formalities i.e., Shop Act, Estimation & costing, Investment procedure - Loan procurement - Banking processes.
<b>5. Productivity</b>	
<b>Duration : 10 hrs</b>	
<b>Marks : 05</b>	
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How it improves or slows down productivity.
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.
<b>6. Occupational Safety, Health and Environment Education</b>	
<b>Duration : 15 hrs</b>	
<b>Marks : 06</b>	
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 hygiene, 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.
<b>7. Labour Welfare Legislation</b>	
	<b>Duration : 05 hrs</b> <b>Marks : 03</b>
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.
<b>8. Quality Tools</b>	
	<b>Duration : 10 hrs</b> <b>Marks : 05</b>
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.

<b>LIST OF TOOLS &amp; EQUIPMENT (For batch of 16 candidates)</b>			
<b>FOUNDRYMAN</b>			
<b>S No.</b>	<b>Name of the Tool &amp; Equipments</b>	<b>Specification</b>	<b>Quantity</b>
<b>A. TRAINEES TOOL KIT</b>			
1.	Tool tray steel	145 x 145 x 5 cm	17 nos.
2.	Taper trowel	18 cm round	17 nos.
3.	Heart and square trowels	3 x 1.2 x 1.2 cm	17 nos.
4.	Trowel heart and scoop		17 nos.
5.	Trowel square and scoop		17 nos.
6.	Trowel double scoop		17 nos.
7.	Trowel double square		17 nos.
8.	Tools Spoon	32 x 16 mm - 25 x 6 m	17 nos.
9.	Cleaner	6 x 300 m	17 nos.
10.	Cleaner	9 x 300 m	17 nos.
11.	Vent wire	3 mm	17 nos.
12.	Peg rammer		17 nos.
13.	Flat rammer	75mm x 25mm height	17 nos.
14.	Rapping spike forged and hardened		17 nos.
15.	Hand bellows	25 cm	17 nos.
16.	Safety goggles (with clear glass)		17 nos.
17.	Goggles (antiglau heat proof)		17 nos.
18.	Cleaner flange		17 nos.
19.	Egg smoother		17 nos.
20.	Smoother round corner		17 nos.



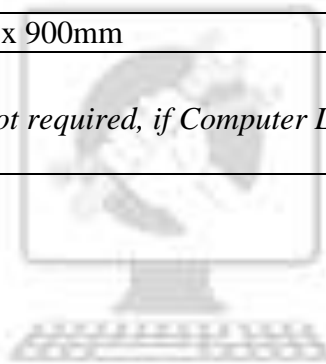
21.	Smoother square corner		17 nos.
22.	Steel rule	300mm	17 nos.
23.	Apron leather or asbestos		17 nos.
24.	Legging pad		17 nos.
25.	Hand gloves (Leather or asbestos)		17 nos.
<b>B. INSTRUMENTS AND GENERAL SHOP OUTFIT</b>			
26.	Hammers Ball Peen	0.45 kg	05 nos.
27.	Ball peen hammers	650 to 700 gms	05 nos.
28.	Sledge hammer	8 kg	02 nos.
29.	Claw hammers	0.75 kg	02 nos.
30.	Chisel cold flat	2x22 cm	11 nos.
31.	Chisel	200x15 mm	11 nos.
32.	File Flat	30 cm Bastard	11 nos.
33.	File Flat	30 cm Second cut	11 nos.
34.	File half round	30 cm bastard	8 nos.
35.	File half round	30 cm second cut	11 nos.
36.	Folding rule	60 cm	5 nos.
37.	Steel rule	600 mm	5 nos.
38.	Caliper odd leg		3 nos.
39.	Caliper inside	15 cm	5 nos.
40.	Scriber		5 nos.
41.	Centre punch	15 cm	5 nos.
42.	Hacksaw	30 cm adjustable	11 nos.
43.	C Clamps	20 cm	11 nos.
44.	C Clamps	30 cm light duty steel	11 nos.
45.	Screw drivers	25cm with 15mm blade	11 nos.
46.	Screw drivers	15 cm	11 nos.
47.	Screw drivers	18 cm	11 nos.
48.	Pliers	20cm	5 nos.
49.	Plane grooving	6mm cutter	3 nos.
50.	Cutting Pliers		3 nos.
51.	Try Square (for wood work)		11 nos.
52.	Brick layers hammer	20cm	11 nos.
53.	Hand lamp wandering lead		3 nos.
54.	Degassing bale	10cm perforated hood	3 nos.
55.	Bench vice	12cm jaw	5 nos.
56.	Work bench for bench vice	(245x125x75cm)	5 nos.

57.	Blow lamp (Kerosene)		5 nos.
58.	Hand saw		3 nos.
59.	Steel measuring tape	3 meter	2 nos.
60.	Trammel		3 nos.
61.	Shovel hand		11 nos.
62.	Engineers try square	15 cm	5 nos.
63.	Lockers steel	with 8 drawers each	4 nos.
64.	Black board with easel		2 nos.
65.	Fire buckets (2 for water and 3 for sand)		5 nos.
66.	Stand for fire buckets		2 nos.
67.	Fire extinguisher foam chemical type		3 nos.
68.	Fire extinguisher soda ash, etc. type CO <sub>2</sub> gas type		1 each
69.	Face shield clear		11 nos.
70.	Helmet (engineers)		11 nos.
71.	Gauntlets leather fettling		11 pairs
72.	Gauntlets leather fettling		11 pairs
73.	Footwear asbestos over shoes		11 pairs
74.	First Aid Box based on burn treatment		1 nos.
75.	Lividers firm joint	20cm	5 nos.
76.	Moulding boxes	30 x 40 x 15 cm RSDL	21 pairs
77.	Moulding boxes	75 x 75 x 25 cm RSDL	21 pairs
78.	Snap flask	40 x 35 x 12 cm RSDL	1 pair
79.	Snap flask	30 x 30 x 10 cm RSDL	1 pair
80.	Spirit level		5 nos.
81.	Wheel Barrows		2 nos.
82.	Weighing machine	(cap: 0.001 to 150gm)	1 no.
<b>C. GENERAL MACHINERY SHOP OUTFIT</b>			
83.	Air Compressor with maximum working pressure	17.5 kg/cm <sup>2</sup>	1 no.
84.	Pneumatic Rammer with Rubber Rammer head		1 no.
85.	Pneumatic Chisel (with suitable chisel)		1 no.
86.	Moulding Sand Muller	35 kg capacity with motor impeller 30 RPM	1 no.
87.	Mould Green Hardness Tester dial type Risdaledielsst.		1 no.
88.	Core hardness tester		1 no.
89.	CO <sub>2</sub> cylinder with CO <sub>2</sub> probe	with nozzle 12 mm wheel valve	1 no.

	and Rubber Hoses		
90.	LPG Cylinder with heating torch		1 no.
91.	Cylinder trolley suitable to CO <sub>2</sub> cylinder and Indane Gas Cylinder		1 no.
92.	Heating and pumping unit to suit to oil fired tilting type crucible furnace with Heating pressure gauge etc. Wesman model SPM Simplex model motorized Rotary gear oil pump pre-heater.		1 no.
93.	Sand Testing Equipment- permeability meter, Universal Strength tester, Sieve shaker, standard sand rammer, Shatter Index Tester, Clay content Tester, Speedy Moisture teller.		1 each
94.	Moulding Machine hand squeeze with stripping device pin lift type.		1 no.
95.	Weighing machine	300 kg by 100 gms	1 no.
96.	Pedestal grinder DE operated	35 cm power	1 no.
97.	Core oven	180 x 90 x 90 cm electric hot air circulated with maximum temperature 350°C adjustable	1 no.
98.	Muffle Furnace (Electric)	Capacity 20kgs.	1 no.
99.	Sand Sampler		1 no.
100.	Auto Sand riddle	3 tons/hors. ridding capacity	1 no.
101.	Sand Erator		1 no.
102.	Oil Fired tilting type crucible furnace	100 crucible	1 no.
103.	Induction furnace	(Cap:50Kg) suitable for non-ferrous metals	1 no.
104.	Pit Furnace	Cap- 100kg	1 no.
105.	Gravity die casting machine	As per requirement	1 no.
106.	USG testing machine	Digital	1 no.
107.	Magnetic particle testing equipment		1 no.
108.	LCD projector	As per requirement	1 no.
109.	Desktop computer with printer	As per requirement	1 no.
110.	White Board with stand	As per requirement	1 no.

<b>TOOLS &amp; EQUIPMENTS FOR EMPLOYABILITY SKILLS</b>		
<b>S No.</b>	<b>Name of the Equipment</b>	<b>Quantity</b>
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.

*Note: Above Tools & Equipments not required, if Computer LAB is available in the institute.*



**Skill India**  
 कौशल भारत - कुशल भारत

**FORMAT FOR INTERNAL ASSESSMENT**

<b>Name &amp; Address of the Assessor:</b>						<b>Year of Enrollment:</b>								
<b>Name &amp; Address of ITI (Govt./Pvt.):</b>						<b>Date of Assessment:</b>								
<b>Name &amp; Address of the Industry:</b>						<b>Assessment location: Industry/ ITI</b>								
<b>Trade Name:</b>			<b>Semester:</b>			<b>Duration of the Trade/course:</b>								
<b>Learning Outcome:</b>														
S 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														