

# OPERATOR (STEEL PLANT)

## COMPETENCY BASED CURRICULUM

(Duration: 1 Year 3 Months)

## APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4



कौशल भारत - कुशल भारत

SECTOR – PRODUCTION & MANUFACTURING



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



Directorate General of Training



**Skill India**  
कौशल भारत - कुशल भारत

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(Revised in 2018)

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**Skill India**  
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Developed By

Ministry of Skill Development and Entrepreneurship  
Directorate General of Training  
**CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE**  
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### 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 22<sup>nd</sup> 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.



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### 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.

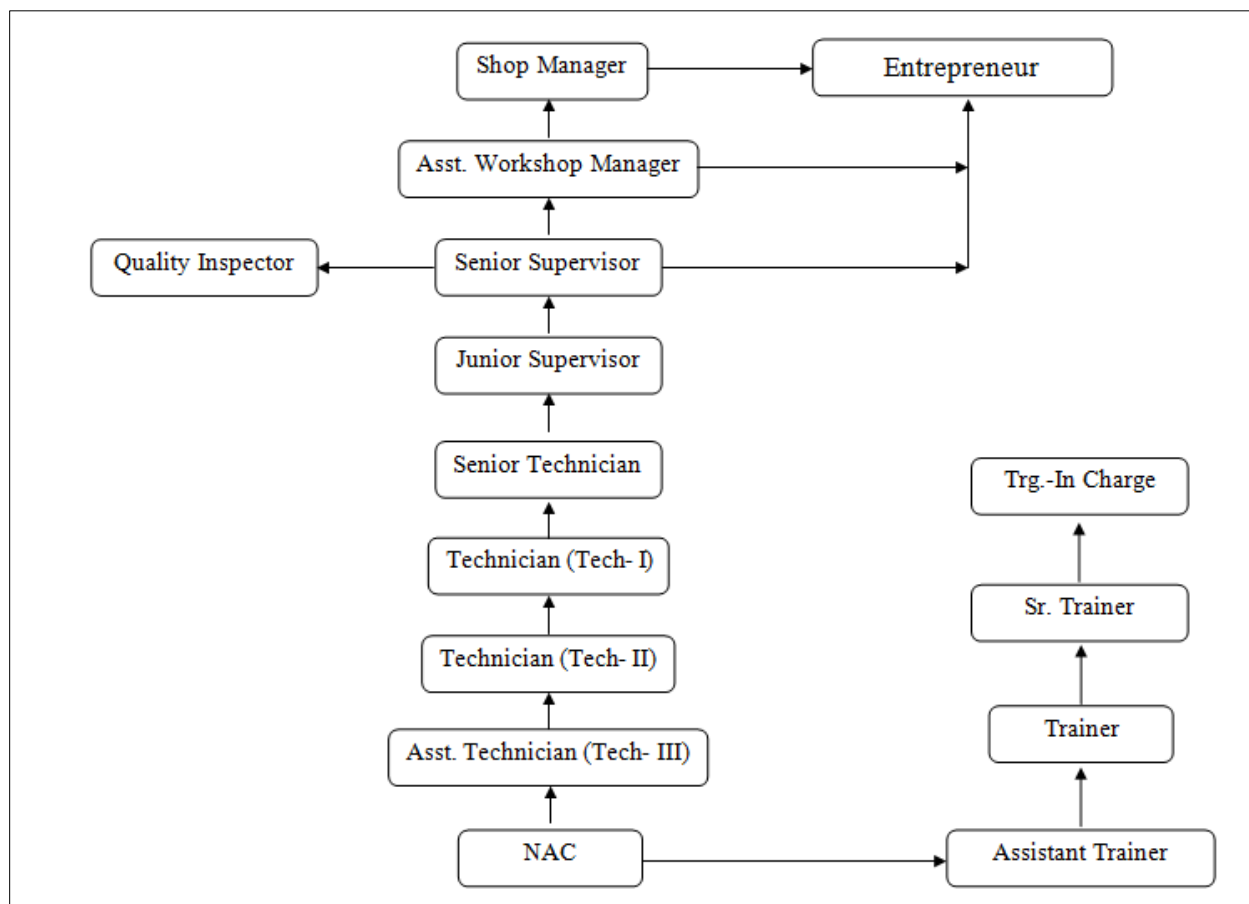
Operator (Steel Plant) trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years (01 Block) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, 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:**

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- 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:

- 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 one year (*Basic Training and On-Job Training*) :-

**Total training duration details: -**

| Time<br>(in months)                       | 1-3      | 4 - 15    |
|-------------------------------------------|----------|-----------|
| Basic Training                            | Block– I | -----     |
| Practical Training<br>(On - job training) | ----     | Block – I |

## Operator (Steel Plant)

### A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1<sup>st</sup> yr. + 03 months in 2<sup>nd</sup> yr.)

For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1<sup>st</sup> 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                |
|         | <b>Total (Including internal assessment)</b> | <b>1000</b>                   | <b>500</b>        |

### B. On-Job Training:-

For 02 yrs. Course (Engg.) :-( **Total 18 months:** 09 months in 1<sup>st</sup> yr. + 09 months in 2<sup>nd</sup> 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     |
|--------------------------------------|----------------|-----------------|-----------|
| <b>For 02 yrs. course</b><br>(Engg.) | 1000 hrs.      | 3120 hrs.       | 4120 hrs. |
| <b>For 01 yr. course</b><br>(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 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 OSH 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) Weight age in the range of 60 -75% to be allotted during assessment                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 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.                        | <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/accuracy achieved while undertaking different work with those demanded by the component/job/set standards.</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)Weight age in the range of above75% - 90% to be allotted during assessment                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 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.                                           | <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/accuracy achieved while undertaking different work with those demanded by the component/job/set standards.</li> <li>• A good level of neatness and consistency in the finish</li> <li>• Little support in completing the project/job</li> </ul>                          |
| (c) Weight age in the range of above 90% to be allotted during assessment                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 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. | <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/accuracy achieved while undertaking different work with those demanded by the component/job/set standards.</li> <li>• A high level of neatness and consistency in the finish.</li> <li>• Minimal or no support in completing the project.</li> </ul>                  |

Brief description of Job roles of Operator (Steel Plant)

- Operate and maintain the equipment relevant to steel plant operation effectively and safely and also upkeep the health of the concerned equipment.
- Blast furnace operation – Cast House Operation Stock House Operation, BF Operation etc.
- Sinter plant operation – RMBB, Stacker Operation, Base Mix Preparation, Sintering etc.
- Coke plant operation – Coal preparation, Crushing Blending, Charging Carbonization etc.
- Pellet plant operation – Raw material preparation, Balling, Indurations, Cooling etc.

In addition Operator (Steel Plant) have the ability to visualize the job, good coordination, mechanical attitude, manual dexterity and perform work related mathematical calculations.

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

May be designated as Operator (Steel Plant) according to nature of work done

**Reference NCO:** 3131.0500  
3133.0200  
3135.1300  
3135.2600

NSQF level for Operator (Steel Plant) trade under ATS: **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 and
- e. Responsibility.



The Broad Learning outcome of Operator (Steel Plant) trade under ATS 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. |

**5. GENERAL INFORMATION**

|                                                                                  |                                                                                                                                                                                            |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name of the Trade</b>                                                         | OPERATOR (STEEL PLANT)                                                                                                                                                                     |
| <b>NCO - 2015</b>                                                                | <b>3131.0500, 3133.0200, 3135.1300, 3135.2600</b>                                                                                                                                          |
| <b>NSQF Level</b>                                                                | Level – 4                                                                                                                                                                                  |
| <b>Duration of Apprenticeship Training</b><br>(Basic Training + On-Job Training) | 3 months + One year (01 Block of 12 month duration).                                                                                                                                       |
| <b>Duration of Basic Training</b>                                                | a) Block –I : 3 months<br><b>Total duration of Basic Training: 3 months</b>                                                                                                                |
| <b>Duration of On-Job Training</b>                                               | a) Block–I: 12 months<br><b>Total duration of Practical Training: 12 months</b>                                                                                                            |
| <b>Entry Qualification</b>                                                       | Passed 10 <sup>th</sup> Class with Science and Mathematics under 10+2 system of Education or its equivalent                                                                                |
| <b>Selection of Apprenticeship</b>                                               | The apprentices will be selected as per Apprenticeship Act amended time to time.                                                                                                           |
| <b>Instructors Qualification for Basic Training</b>                              | As per ITI instructors qualifications as amended time to time for the specific trade.                                                                                                      |
| <b>Examination</b>                                                               | The internal examination/ assessment will be held on completion of each block.<br>Final examination for all subjects will be held at the end of course and same will be conducted by NCVT. |
| <b>Rebate to Ex-ITI Trainees</b>                                                 | 03 months                                                                                                                                                                                  |
| <b>CTS trades eligible for Operator (Steel Plant) Apprenticeship</b>             | 1. Operator (Steel Plant)                                                                                                                                                                  |

**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 Operator (Steel Plant) course of 01 years duration under ATS.

#### Block I:-

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 -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
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, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
4. Select and ascertain measuring instrument 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 organize the work related to the occupation.

### 6.2 SPECIFIC LEARNING OUTCOME

#### Block – I

1. Practice and understand precautions to be followed while working in fitting jobs.
2. Prepare different types of documentation as per industrial need by different methods of recording information.

### *Operator (Steel Plant)*

3. File and fit matting parts with in an accuracy of  $\pm 0.02$  mm and to ISI specification.
4. Scrape angular matting and sliding surfaces and original flat surfaces without master.
5. Prepare keys and key ways a shaft and assemble.
6. Drill through holes and blind holes at an angle.
7. Hand and machine reaming on finish drilled holes
8. Ream tapers and fit pins.
9. Bend steel pipes to different radius and angles.
10. Thread standard pipes, join pipes and make pipe assemble.
11. Dismantle, and minor repair and assemble simple machine tools such as drill machine, shaper, lathe and power saw.
12. Erect and align machines.
13. Assemble finished mechanical component to from specific unit or machine such as grinder pump etc. Using hand tools and machines.
14. Dismantle or remove worn out broken or defective parts using hand tools and replace them by repaired or new one's test completed article to ensure correct performance.
15. Fit parts together in set order using nuts, bolts, screws and pins etc. with necessary wrenches, spanners and other special tools.

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

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**7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA**

| <b>GENERIC LEARNING OUTCOME</b>                                                                           |                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LEARNING OUTCOMES</b>                                                                                  | <b>ASSESSMENT CRITERIA</b>                                                                                                                                                                                            |
| 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, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction. |

Operator (Steel Plant)

|                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| electrical and                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                            |
| apply in day to day work. <i>[Different mathematical calculation &amp; science -Work, Power &amp; Energy, Algebra, Geometry &amp; Mensuration, Trigonometry, Heat &amp; Temperature, Levers &amp; Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]</i>                                                                                                                                    | 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. <i>[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components &amp; different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical &amp; electronic symbol]</i> | 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, and labour welfare legislation and apply such in day to day                                                                                                                                                                                                                                                                                                           | 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                                                   |

*Operator (Steel Plant)*

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| work to improve productivity & quality.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 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.                                                                                                                          |
| <b>SPECIFIC OUTCOME</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                 |
| <b><u>Block-I</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                 |
| <p><i>Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under <b>Block – I</b>(section: 10) must ensure that the trainee works in familiar, predictable, routine, situation of clear choice. Assessment criteria should broadly cover the aspect of <b>Planning</b> (Identify, ascertain, etc.); <b>Execution</b> apply factual knowledge of field of knowledge, recall and demonstrate practical skill during performing the work in routine and repetitive in narrow range of application, using appropriate rule and tool, complying with basic arithmetic and algebraic principles and language to communicate in written or oral with required clarity; <b>Checking/ Testing</b> to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for his/her own work and learning.</i></p> |                                                                                                                                                                                                                                                 |

**BASIC TRAINING (Block – I)****Duration: (03) Three Months**

| Week No. | Professional Skills (Trade Practical)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Professional Knowledge (Trade Theory)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.       | <ol style="list-style-type: none"> <li>1. Safety: - its importance, classification, personal, general, workshop and job safety.</li> <li>2. Occupational health and safety.</li> <li>3. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution &amp; personal safety message.</li> <li>4. Preventive measures for electrical accidents &amp; steps to be taken in such accidents.</li> <li>5. Importance of housekeeping &amp; good shop floor practices.</li> <li>6. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc.</li> <li>7. Fire &amp; safety: Use of Fire extinguishers.</li> <li>8. Safety regarding working with different types of steam and its First-Aid.</li> </ol> | <p>Importance of safety and general precautions observed in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Institute system including stores procedures.</p> <p>Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE).</p> <p>Response to emergencies e.g.; power failure, fire, and system failure.</p> <p>Accidents- Definition types and causes.</p> <p>First-Aid, nature and causes of injury and utilization of first-aid.</p> <p>Introduction to 5S concept &amp; its application.</p> <p>Fire: - Types, causes and prevention methods. Fire Extinguisher, its types.</p> <p>Define environment, environment Pollution, Pollutants, type of Pollution (Air pollution, water pollution, soil pollution noise pollution, thermal pollution, radiation.</p> <p>Global warming its causes and remedies.</p> <p>Industrial Waste its types, sources and waste Management.</p> |
| 2.       | <ol style="list-style-type: none"> <li>9. Use of simple measuring and marking instruments. Use of steel rule, callipers, micrometre's in measuring lengths.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ol style="list-style-type: none"> <li>a) Units of measurement in SI</li> <li>b) Construction, use, function and type of marking, measuring, testing and cutting tools such as vices, hammers, hacksaw,</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

*Operator (Steel Plant)*

|    |                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>10. Marking of lines and curves.</p> <p>11. Flat chipping practice on mild steel.</p> <p>12. Hacksawing practice.</p> <p>13. Sharpening of chisel.</p> <p>14. Filing of flat surface up to an accuracy of 0.2mm.</p> <p>15. Marking out positions of holes, drilling and counter sinking.</p> <p>16. Internal and external threading.</p>                             | <p>chisels, files, drill, tap, die, Steel rule, callipers, punches, reamer, scarpers etc</p> <p>c) Types, uses and working principle of precision instruments like micrometers, vernier callipers, depth gauge, dial indicators etc.</p> <p>d) Introduction to various power transmission systems.</p> <p>e) Different types of bearings and their use.</p> <p>f) Various types of gears, their use.</p> <p>g) Introduction to lubrication system.</p> <p>h) Safety precautions to observe while working on bench.</p>                                                                                                                                                                                                                                               |
| 3. | <p>17. Simple testing of refractory bricks like hardness, specific gravity and porosity.</p> <p>18. Cutting bricks to different shape and size.</p> <p>19. Mortars – preparation methods, proportion of different ingredient of mortar.</p> <p>20. Laying bricks for straight wall, arches etc. by using common masonry tools and by using different joining methods</p> | <p>a) Introduction to refractories. Acid, basic, neutral and special refractories (stamping, LC castable, normal castable)</p> <p>b) Importance of refractories in Iron &amp; Steel industry</p> <p>c) Different shape, size and quality of refractory bricks.</p> <p>d) Introduction to common masonry tools.</p> <p>e) Stamping material application along with expansion joints</p> <p>f) Knowledge of castable</p> <p>g) Use of refractories in coke-oven battery, L D Vessel, re-heating furnaces, blast furnace cast house</p> <p>h) Furnace operation for longer life of refractory lining.</p> <p>i) Reading simple drawing related to mason work.</p> <p>j) Cost of refractories &amp; prevention of wastage.</p> <p>Safety precautions related to job.</p> |
| 4. | <p>21. Study of various types of fuels (Coal, Oil, Gases)</p> <p>22. Sample study of pit, lignite, bituminous coal and anthracite</p>                                                                                                                                                                                                                                    | <p>1. Type of furnaces</p> <p>2. Introduction to fuel and combustion.</p> <p>3. Coal and types of coal.</p> <p>4. Natural and prepared fuel, non-</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>renewable (fossil fuels) and renewable fuel.</p> <p>5. Flash and fire point of fuel, viscosity of furnace of oils.</p> <p>6. Types of gaseous fuel available in a Steel plant &amp; their uses.</p> <p>7. Composition and calorific values of fuel oils, natural gas, BF gas, Coke Ovens gas etc.</p> <p>8. Various conditions necessary to obtain maximum heat from the fuel burned – concept of air to fuel ratio</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 5    | <p>23. Measurement of pressure, temperature, level and flow.</p> <p>24. Use of recorder and manometers.</p> <p>25. Application of radiation pyrometers.</p> <p>26. Use of pressure gauges and vacuum gauges. Level gauges, flow gauges and rota meters.</p> <p>27. Calibration practice of instruments.</p> <p>28. Study of Transducers, Sensors, Recorders)</p> <p>29. Practice on simple programming of PLC.</p> <p>30. Interfacing of PLC with system</p> | <p>a) Units of measurements for various parameters like pressure, temperature, level and flow.</p> <p>b) Mechanical and electrical means of measuring temperature.</p> <p>c) Construction &amp; types of pressure gauges, vacuum gauges, level gauges, flow gauges and rota meters</p> <p>d) Introduction &amp; application of recorder, manometers and radiation pyrometers &amp; thermocouple.</p> <p>e) Introduction to conductivity meter, pH meter, hardness meter and</p> <p>f) Type of gas analyzer –NDIR, UV, Chemiluminescent</p> <p>g) Concept of calibration of instruments.</p> <p>h) Introduction to process control &amp; instrumentation. Principle of controlling different process control parameters</p> <p>i) Types of Sensor, Transducers, controller-ON/OFF, P, I, PI, PD and PID.</p> <p>j) Introduction to PLC and its architecture. Programming concept of PLC, Uses of PLC in automation of industrial process</p> <p>Safety precaution to be observed</p> |
| 6-7. | 31. Practical application of safety in electrical shop                                                                                                                                                                                                                                                                                                                                                                                                       | <p>a) Safety precautions to be observed while</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <p>32. Measurement current, voltage, resistance, Power, Power factor; Testing of capacitors, frequency</p> <p>33. Making simple AC, DC circuits- Series, parallel and mixed circuits. Electric wiring practice. Earthing.</p> <p>34. Application of various types of switches, fuses, lamps, proximity switches, contactor, relays, lamps and MCB in electrical circuits.</p> <p>35. Use of test lamps, multi-meters, etc.</p> <p>36. Practice on Soldering</p> <p>37. Study of gates, logic circuits</p> <p>38. Demonstration on various weighing system</p> <p>39. Familiarisation with computer</p> <p>40. Application of MS Office</p> <p>41. Practice on networking and internet &amp; email</p> | <p>working on electrical shop</p> <p>b) Current, voltage, resistance, inductance, capacitance &amp; Ohm's Law. Work, power and energy; their units, measurements.</p> <p>c) Construction , types &amp; use of switches, fuses, lamps, proximity switches, capacitors, relays, and MCB</p> <p>d) Function of test lamps, multi-meters, ammeter, volt meter, megger, watt meter, energy meter.</p> <p>e) Simple AC, DC circuits. Series, parallel and mixed circuits. Earthing&amp; its purpose.</p> <p>f) Introduction to Electrical motors and starters. Speed control</p> <p>g) Function to multi-meters.</p> <p>h) Semiconductor diodes, constructions and lead identification</p> <p>i) DC power supply, rectifier, voltage regulator using IC's. SMPS,INVERTER,UPS,</p> <p>j) Bipolar transistors, construction, parameters, uses, testing and identification of leads.</p> <p>k) Solder, flux, soldering techniques</p> <p>l) Digital electronic- basic idea, gates, logic circuits</p> <p>m) Concept of various electronic weighing systems.</p> <p><b>Computer</b></p> <p>a) Basics of computer hardware and software.</p> <p>b) MS Office.</p> <p>Concepts of computer networking and Internet and email.</p> |
| 8-9 | <p>42. Familiarisation of various type of hydraulic elements such as: valves, actuators and fluid filters,</p> <p>43. Study of various types of pumps</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>a) Basic principles of Hydraulic Power Transmission.</p> <p>b) Introduction to various types of Pumps, valves, actuators, hydraulic fluid and</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>used in hydraulic system</p> <p>44. Familiarisation of various type of pneumatic elements such as: control valves, actuators, filter, pressure regulator and lubricator, their symbol .</p> <p>45. Making &amp; study of simple hydraulic and pneumatic circuits.</p> <p>46. Study of simple Electro-hydraulic and electro-pneumatic circuit.</p> <p>47. Identification of various types of pumps, their parts and their functions</p> <p>48. Dismantling, cleaning of parts and assembly of parts for different types of pumps</p> <p>49. Use of different type of valve like: Gate, Globe, butterfly, Diaphragm</p> <p>50. Assembly and disassembly of valves</p> | <p>fluid filtration.</p> <p>c) Different types of pneumatic control valves, actuators, FRL unit.</p> <p>d) Symbols of hydraulic &amp; pneumatic components.</p> <p>e) Simple hydraulic and pneumatic circuits.</p> <p>f) Safety precautions to be observed while working with hydraulic and pneumatic equipments.</p> <p>g) Study of simple Electro-hydraulic and electro-pneumatic circuit.</p> <p>h) Maintenance &amp; trouble shooting of hydraulic and pneumatic system</p> <p><b><u>Pump and Valve Operation</u></b></p> <p>a) Constructional detail of pumps, types, working mechanism</p> <p>b) Different parts of pump and their function.</p> <p>c) Priming of pump, air locking</p> <p>d) Series &amp; parallel operation of pump</p> <p>e) Preventive &amp; schedule maintenance of pumps, Trouble shooting in pump operation, Gland packing changing procedure</p> <p>f) Constructional detail of different type of valve &amp; their uses like: Gate, Globe, butterfly, Diaphragm</p> <p>g) Symbols of valves</p> <p>Concept of Cavitations, &amp; aeration.</p> |
| 10 | <p>51. Make sliding 'T' fit.</p> <p>52. Make sliding fit with angles other than 90°</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Interchangeability: Necessity in Engg, field definition, BIS. Definition, types of limit, terminology of limits and fits-basic size, actual size, deviation, high and low limit, zero line, tolerance zone Different standard systems of fits and limits. British standard system, BIS system</p> <p>Method of expressing tolerance as per BIS</p> <p>Fits: Definition, types, description of each with sketch. Vernier height gauge: material construction, parts, graduations (English &amp;</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Metric) uses, care and maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 10. | <p>53. Use of protective devices</p> <p>54. Use of gas safety devices</p> <p>55. Study on dust handling &amp; disposal system</p> <p>56. Identification of different type of pipe</p> <p>57. Application of different colour codes, pipe symbols and circuits.</p> <p>58. Pipe threading.</p> <p>59. Mark, cut and prepare different pipe joints.</p> <p>60. Develop, mark, cut and prepare pipe bending.</p> <p>61. Use of tubes, hoses, different fittings and assembly, quick connecting couplings</p> | <p>a) Various hazard involve in different section steel plant</p> <p>b) OSHAS, Safety standard &amp; slogan</p> <p>c) Safety symbols &amp; chart</p> <p>d) Various protective devices used in steel plant</p> <p>e) Gas safety</p> <p>f) Fire fighting</p> <p>g) Quality management system</p> <p>h) TPM and TOC.</p> <p>i) Bench Marking, Suggestion management.</p> <p>j) Problem solving technique, control chart &amp; their uses</p> <p>k) Attitude development</p> <p>l) Communication and presentation skill</p> <p><b><u>Emission, Pollution Control and emission monitoring:</u></b></p> <p>a) Awareness of environment pollution and health effect.</p> <p>b) Basic knowledge of air pollution control equipment.</p> <p>c) Major emission and pollution source and their effect on global environment.</p> <p>d) Control of NO<sub>2</sub> and SO<sub>2</sub> and SPM to permissible level.</p> <p>e) NOX &amp; SOX with respect to coke plant &amp; BF stoves</p> <p>f) Dust handling and disposal system.</p> <p>g) Effluent treatment plants</p> <p>h) Control of water pollution</p> <p>i) Standard of ambient air quality, work environment, effluent discharge.</p> <p><b><u>Industrial Piping System</u></b></p> <p>a) Types of pipe</p> <p>b) Concept of different colour codes, symbols and circuits.</p> |

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|    |                                                | <p>c) Tubes, hoses, different fittings and assembly, Quick couplings</p> <p>d) Repair techniques of pipe joints</p> <p>e) Safety precautions to be observed while working at pipeline carrying different materials.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 11 | 62. Video demo on Steel manufacturing process. | <p><b>Process Technology:</b></p> <p><b>Orientation on Steel manufacturing process</b></p> <p>a) <b>Coke Making:</b> Construction, type and use of crusher, feeder, screening Detail of Oven M/c, charging, pushing, isolation, heating techniques, Details of gas handling plant, Coke ovens bi-product plant &amp; gas Exhauster booster, Safety involved in handling Explosive &amp; Poisonous Gas, Gas Holder</p> <p>b) Coke property testing &amp; Quality, Coke handling</p> <p>c) <b>Sinter Making:</b> Raw Material for Sinter, Sinter Making Theory, Detail of base mix preparation, Sinter quality control, effect of bad sinter on Blast furnace</p> <p>d) <b>Pellet Making</b> – Raw material for pellet making. Theory of raw material preparation. Balling, indurations, cooling of pellets. Pellet quality control. Effect of pellet quality in BF.</p> <p>e) <b>Iron Making:</b> Basics of Cast house, Tap hole face maint., clay leakage control, trough &amp; runners repair maintenance, mud gun and drill machine operation and maintenance, trough discharge, knowledge of furnace operation: blowing, burdening, back drafting, stopping and starting procedure. Construction of stoves, heating operation. Stock house, cooling system, coal injection, tar injection. Safety in Cast house.</p> |

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|    |                                                                                                             | <p>f) <b>Steel Making:</b> Primary &amp; secondary steel making (including tapping control, deviation &amp; chemical control ), continuous casting, Safety in Steel making</p> <p>g) <b>Rolling technology:</b> Hot &amp; cold rolling theory &amp; process, Continuous &amp; tandem mill, rolling defect etc. Processing line: pickling, galvanising, annealing, tinning etc.</p> <p><b>Elementary knowledge of heat treatment processes</b></p>                                                                                                                                                                                        |
| 12 | <p>63. Video demo of Reheating furnace.</p> <p>Practice different knots and safe handling of materials.</p> | <p><b><u>Reheating furnace:</u></b></p> <p>Furnace types and their classification, like, reheating furnaces, walking beam furnace, refining furnace. Furnace atmosphere and its control, Function of recuperator, regenerator. Drafts: forced and induced draft. Burners: Types and applications. Safety precaution and hazards</p> <p><b><u>Rigging and crane operation:</u></b></p> <p>Introduction to various tools and tackles used in rigging, their safe load capacity. Different types of knots and hitches and their use, reaving pulley block, Safety while moving materials from one place to another and operating crane.</p> |
| 13 | <b>Revision&amp; Internal Assessment</b>                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

**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.

**9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING**

| Block – I |                                                                                                                                                                                                                                                  |                                                                                                                                                                                               |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sl. No.   | Workshop Calculation and Science<br>(Duration: - 20 hrs.)                                                                                                                                                                                        | Engineering Drawing<br>(Duration : - 30 hrs.)                                                                                                                                                 |
| 1.        | Different states of matter<br>Units & measurement<br>Newton's law of motion<br>Work, Power & Energy<br>Equation of Motion<br>Composition & Resolution of Force<br>Density & Specific gravity<br>Properties of Liquid                             | Introduction to engineering drawing.                                                                                                                                                          |
| 2.        | Archimedes Principle<br>Gas Laws<br>Pressure & Its measurement<br>Friction<br>Heat & temperature measurement<br>a) Methods of heat transfer<br>b) Thermal expansion of matter<br>Magnetism<br>Electricity & its uses<br>Methods of Heat transfer | Geometrical Drawing, Orthographic projection (first angle and third angle), dimensioning, Introduction to geometrical tolerance, Sectional drawing, Isometric projection, Structural Drawing, |
| 3.        | Chemical Formulae & Symbols<br>Matter & Its Properties<br>Periodic Classification of Elements                                                                                                                                                    | Blue print reading                                                                                                                                                                            |
| 4.        | Acid, Base & Salts<br>Atoms, Molecules & Its weights<br>Laws of Chemical combination /<br>Conservation of mass                                                                                                                                   | ---                                                                                                                                                                                           |
| 5.        | Coal & its compounds<br>Gay Lucas's Law of Gaseous volume<br>Properties of metal, heat treatment                                                                                                                                                 | ---                                                                                                                                                                                           |
| 6.        | Mensuration (Calculation of Area, volume & weight of simple & hollow solids<br>Ratio, proportion & Percentage                                                                                                                                    | ---                                                                                                                                                                                           |

*Operator (Steel Plant)*

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|    | Simple Algebra<br>Trigonometry (Use of trig. Tables,<br>applied problems, trig. Function & sine<br>bar principle)                                                                                             |     |
| 7. | Plotting of Graphs for given data,<br>reading of graphs.<br>Trade calculation such as capacity &<br>volume of the furnace, weight &<br>volume of stock.<br>Binary number, logic gates<br>Estimation & costing | --- |



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## 9.2 EMPLOYABILITY SKILLS

| Topic No. | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Duration (in hours) |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
|           | <b>English Literacy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>7</b>            |
| 1.        | Reading<br><b>Reading and understanding simple sentences about self, work and environment</b>                                                                                                                                                                                                                                                                                                                                                                                                       |                     |
| 2.        | Writing<br><b>Construction of simple sentences Writing simple English</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |
| 3.        | Speaking / Spoken English<br><b>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. 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.</b> |                     |
|           | <b>I.T. Literacy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>10</b>           |
| 1.        | Basics of Computer<br><b>Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.</b>                                                                                                                                                                                                                                                                                                                                            |                     |
| 2.        | Word processing and Worksheet<br><b>Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion &amp; 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. Use of External memory like pen drive, CD, DVD etc,</b>   |                     |
| 3.        | Computer Networking and INTERNET<br><b>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.</b>                                                                                                                                                                                                                                                                                         |                     |
|           | <b>Communication Skill</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>18</b>           |
| 1         | Introduction to Communication Skills<br><b>Communication and its importance<br/>Principles of Effective communication<br/>Types of communication - verbal, nonverbal, written, email, talking on phone.<br/>Nonverbal communication - components-Para-language</b>                                                                                                                                                                                                                                  |                     |

|           |                                                                                                                                                                                                                                                                                                                |          |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|           | <b>Body - language</b><br><b>Barriers to communication and dealing with barriers.</b>                                                                                                                                                                                                                          |          |
| <b>2</b>  | Listening Skills<br><b>Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.</b>                                                                                                                                                           |          |
| <b>3</b>  | Motivational Training<br><b>Characteristics Essential to Achieving Success</b><br><b>The Power of Positive Attitude</b><br><b>Self awareness</b><br><b>Importance of Commitment</b><br><b>Ethics and Values</b><br><b>Ways to Motivate Oneself</b><br><b>Personal Goal setting and Employability Planning.</b> |          |
| <b>4</b>  | Facing Interviews<br><b>Manners, Etiquettes, Dress code for an interview</b><br><b>Do's &amp; Don'ts for an interview</b>                                                                                                                                                                                      |          |
|           | <b>Entrepreneurship skill</b>                                                                                                                                                                                                                                                                                  | <b>8</b> |
| <b>1.</b> | <b>Concept of Entrepreneurship</b><br><b>Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue.</b><br><b>Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.</b>                                                                                      |          |
| <b>2.</b> | Institutions Support<br><b>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&amp; procedure &amp; the available scheme.</b>                                        |          |
|           | <b>Productivity</b>                                                                                                                                                                                                                                                                                            |          |
| <b>1.</b> | <b>Productivity</b><br>Definition, Necessity.                                                                                                                                                                                                                                                                  |          |
| <b>2.</b> | <b>Affecting Factors</b><br>Skills, Working Aids, Automation, Environment, Motivation<br>How improves or slows down.                                                                                                                                                                                           |          |
| <b>3.</b> | <b>Personal Finance Management</b><br>Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.                                                                                                                                                                      |          |
|           | <b>Occupational Safety, Health &amp; Environment Education</b>                                                                                                                                                                                                                                                 | <b>6</b> |
| <b>1</b>  | Safety & Health<br><b>Introduction to Occupational Safety and Health importance of safety and health at workplace.</b>                                                                                                                                                                                         |          |

|    |                                                                                                                                                                                                                                                                              |   |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 2  | Occupational Hazards<br><b>Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders &amp; its prevention.</b>                          |   |
| 3  | Accident & safety<br><b>Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.</b>                                                                                                                            |   |
| 4  | First Aid<br><b>Care of injured &amp; Sick at the workplaces, First-Aid &amp; Transportation of sick person</b>                                                                                                                                                              |   |
|    | <b>Labour Welfare Legislation</b>                                                                                                                                                                                                                                            |   |
| 1  | Welfare Acts<br><b>Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.</b>                                                                                                         | 6 |
|    | <b>Quality Tools</b>                                                                                                                                                                                                                                                         |   |
| 1. | <b>Quality Consciousness :</b><br>Meaning of quality, Quality Characteristic                                                                                                                                                                                                 |   |
| 2. | <b>Quality Circles :</b><br>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. |   |
| 3. | <b>House Keeping :</b><br>Purpose of Housekeeping, Practice of good Housekeeping.                                                                                                                                                                                            |   |
| 4. | Quality Tools<br><b>Basic quality tools with a few examples</b>                                                                                                                                                                                                              |   |

## 10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

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

### Block – I

1. Practice and understand precautions to be followed while working in fitting jobs.
2. Prepare different types of documentation as per industrial need by different methods of recording information.
3. Dismantling and assembly of mechanical components using mechanical and hydraulic puller and press.
4. Dismantle gear boxes, fans, blowers and identify various parts.
5. Do levelling, alignment and balancing.
6. Use of Lubrication equipment's
7. Levelling jointing and plastering operation.
8. Making of expansion joints in brick wall.
9. Stamping material application along with expansion joints
10. Application of castable
11. Pitching, gunning, fettling etc and other temporary repairs of refractory work.
12. Drying & heating of refractory after application
13. Practice of simple drawing related to refractory work.
14. Proximate & ultimate analysis of fuel
15. Determination of flash and fire point of fuels, viscosity of furnace oils.
16. Determination of composition and calorific values of fuels (oils, natural gas, BF gas, Coke Ovens gas etc.)
17. Study of various zones of burner and control of flame length and flame temperature of a burner. Self sustaining flames, supported flames, flame sensors.
18. Air & fuel ratio for complete combustion and analysis of the flue gas for un-burnt combustion and applying corrective measures.
19. Use of Conductivity meter, pH meter, hardness meter and
20. Use of gas analyzer.
21. Practice on setting & tuning of different controller- ON/OFF, P,I,PI,PD and PID controllers (electronic/pneumatic types)
22. Practice on controlling of pressure, temperature, level & flow using demonstration kits.
23. Upkeep of PLC.
24. Insulation testing
25. Installation, running care & maintenance of electric meters.
26. Testing and identification of leads of diodes, bipolar transistors,
27. Maintenance & trouble shooting of hydraulic and pneumatic system
28. Priming of pump, fitting gland packing.
29. Starting and stopping of pumps.
30. Preventive & schedule maintenance of pumps, Trouble shooting in pump operation.
31. Demonstration on cavitations& aeration

### *Operator (Steel Plant)*

32. Use of fire fighting equipment
33. Use of problem solving techniques, control chart
34. Practice coal injection lance assembly (including NRV) and its changing online
35. Use of emission and pollution control devices.
36. Study on effluent treatment plants
37. Study of emission monitoring
38. **Coke Making:** Operation of Oven M/c, charging, pushing, isolation, heating, Operation of Gas handling plant (BPP) & Gas Exhauster booster, Coke property testing & Quality, Coke handling
39. **Sinter Making:** Sintering, Sinter quality control,
40. **Iron Making:** Cast house operation:- Basics of Cast house, Tap hole face maint., clay preparation, clay leakage control, trough & runners repair maintenance, mud gun and drill machine operation and maintenance, trough discharge, handling of hot-metal & slag under normal & viscous conditions. Furnace operation:-blowing, burdening, backdrafting, stopping and starting. Stoves: manual heating & auto operation. Operation of stock house, coal injection, tar injection.
41. **Steel Making:** Study & practice on primary & secondary steel making (including tapping control, deviation & chemical control), continuous casting, Billet caster Slab caster.
42. **Rolling technology.:** Operation of hot rolling Operation of cold rolling, Processing lines (Annealing, skin passing, pickling, Galvanising, tinning)
43. Charging & discharging of Furnace
44. Judging & noting the temperature of material inside the furnace
45. Controlling the air and fuel ratio to maintain temperature inside the furnace
46. Control of furnace atmosphere
47. Cleaning of burners
48. Use of rigging tools and tackles.
49. Making knots and hitches, reaving pulley block and scaffolding.
50. Use of crane signals.
51. Loading, unloading and shifting common and uncommon shaped materials.
52. Basic operation of EOT crane.

### **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**

| <b>OPERATOR (STEEL PLANT)</b>                                                                               |                                                      |                                          |                 |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------|-----------------|
| <b>LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)</b>                                  |                                                      |                                          |                 |
| <b>A. TRAINEES TOOL KIT ( For each additional unit trainees tool kit Sl. 1-18 is required additionally)</b> |                                                      |                                          |                 |
| <b>Sl. no.</b>                                                                                              | <b>Name of the Tool &amp; Equipments</b>             | <b>Specification</b>                     | <b>Quantity</b> |
| 1                                                                                                           | Steel Rule with metric & British graduation          | 150 mm, Stainless steel                  | 21 nos.         |
| 2                                                                                                           | Try Square.                                          | 150 mm blade                             | 21 nos.         |
| 3                                                                                                           | Caliper inside spring type.                          | 150 mm                                   | 21 nos.         |
| 4                                                                                                           | Caliper hermaphrodite spring type                    | 150 mm                                   | 21 nos.         |
| 5                                                                                                           | Caliper outside spring type                          | 150 mm                                   | 21 nos.         |
| 6                                                                                                           | Divider spring type                                  | 150 mm                                   | 21 nos.         |
| 7                                                                                                           | Scriber                                              | 150 mm                                   | 21 nos.         |
| 8                                                                                                           | Centre Punch                                         | 10 mm and Length - 120 mm                | 21 nos.         |
| 9                                                                                                           | Screw driver                                         | 150mm insulated flat type                | 21 nos.         |
| 10                                                                                                          | Chisel cold flat                                     | 20 mm X 150 mm High carbon steel         | 21 nos.         |
| 11                                                                                                          | Hammer ball peen With handle                         | 450 grams (1 lb)                         | 21 nos.         |
| 12                                                                                                          | Hammer ball peen With handle.                        | 220 grams (1/2 lb)                       | 21 nos.         |
| 13                                                                                                          | File flat - second cut                               | 250 mm                                   | 21 nos.         |
| 14                                                                                                          | File flat smooth                                     | 250 mm.                                  | 21 nos.         |
| 15                                                                                                          | File half round second cut                           | 150 mm.                                  | 21 nos.         |
| 16                                                                                                          | Hacksaw frame fixed type                             | 300 mm                                   | 21 nos.         |
| 17                                                                                                          | Safety goggles.                                      |                                          | 21 nos.         |
| 18                                                                                                          | Dot punch                                            | 100 mm                                   | 21 nos.         |
| <b>B : INSTRUMENTS &amp; GENERAL SHOP OUTFIT</b>                                                            |                                                      |                                          |                 |
| 19.                                                                                                         | Steel Rule Graduated both in Metric and English Unit | 300 mm Stainless steel                   | 4 nos.          |
| 20.                                                                                                         | Straight edge steel                                  | 300 mm or above                          | 2 nos.          |
| 21.                                                                                                         | Spirit Level metal Type - 2                          | 300 mm Basic Length Accuracy 0.1mm/Meter | 1 no.           |

*Operator (Steel Plant)*

|                            |                                                                                                                                 |              |            |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------|------------|
| 22.                        | Stud Extractor EZY - out                                                                                                        | Set of 8     | 2 sets     |
| 23.                        | Combination Set                                                                                                                 | 300 mm       | 2 nos.     |
| 24.                        | Micrometer outside.                                                                                                             | 25 - 50 mm   | 2 nos.     |
| 25.                        | Vernier caliper                                                                                                                 | 150 mm       | 4 nos.     |
| 26.                        | Wire gauge, metric standard.                                                                                                    |              | 1 no.      |
| 27.                        | 'U' tube manometers                                                                                                             |              | 1 no.      |
| 28.                        | Bourdon tube type gauges of various ranges.                                                                                     |              | 5 nos.     |
| 29.                        | Aneroid barometers                                                                                                              |              | 1 no.      |
| 30.                        | Dead weight tester                                                                                                              |              | 1 no.      |
| 31.                        | Differential pressure transmitter (pneumatic)                                                                                   |              | 1 no.      |
| 32.                        | Differential pressure transmitter (electronic- HART/ field bus type)                                                            |              |            |
| 33.                        | Pressure transducers training kits.<br>Potentiometer<br>Capacitive<br>Reluctive<br>Strain gauge<br>LVDT load<br>Cell servo Type |              | 1 no. each |
| 34.                        | Orifice type flow meter                                                                                                         |              | 1 no.      |
| 35.                        | Ventury tube flow meter                                                                                                         |              | 1 no.      |
| 36.                        | Rotameter                                                                                                                       |              | 1 no.      |
| 37.                        | Level transmitter (inter face)(HART/ field bus/ profibus compatible)                                                            |              | 1 no. each |
| 38.                        | Mercury in glass thermometer (various ranges)                                                                                   |              | 1 no.      |
| 39.                        | Optical pyrometer with all accessories                                                                                          |              | 1 no.      |
| 40.                        | Temperature transmitter, pneumatic                                                                                              |              | 1 no.      |
| 41.                        | Pneumatic and electronic recorders (single point and multi point) both circular and strip chart types.                          |              | 1 no. each |
| 42.                        | PID controller trainer consisting of instrument panel, digital computer and interface system                                    |              | 1 no.      |
| 43.                        | Progmmable logic controller (micro PLC) trainer                                                                                 |              | 1 no.      |
| <b>GENERAL SHOP OUTFIT</b> |                                                                                                                                 |              |            |
| 44.                        | Surface plate C.I./Granite with Stand and Cover                                                                                 | 600 x 600 mm | 1 nos.     |

*Operator (Steel Plant)*

|     |                                                      |                                                                                               |            |
|-----|------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------|
| 45. | Marking table (Mild steel)                           | 900X900X900 mm                                                                                | 1 no.      |
| 46. | Universal scribing block.                            | 220 mm                                                                                        | 2 nos.     |
| 47. | V-Block pair with clamps                             | 150 x 100 x 100 mm                                                                            | 2 nos.     |
| 48. | Angle plate                                          | 150 X 150 X 250 mm                                                                            | 2 nos.     |
| 49. | Punch letter set.                                    | 3 mm                                                                                          | 1 no.      |
| 50. | Punch number set.                                    | 3 mm                                                                                          | 1 no.      |
| 51. | Portable hand drill (Electric)                       | 0 to 13 mm Capacity                                                                           | 1 no.      |
| 52. | Drill twist straight shank                           | 3 mm to 12 mm by 0.5 mm H.S.S.                                                                | 2 sets     |
| 53. | Drill twist Taper shank                              | 8 mm to 20 mm by 0.5 mm H.S.S.                                                                | 2 sets     |
| 54. |                                                      |                                                                                               |            |
| 55. | Taps and dies complete set                           | 5, 6, 8, 10 & 12 mm set of 5                                                                  | 2 Sets     |
| 56. | File knife edge smooth                               | 150 mm                                                                                        | 4 nos.     |
| 57. | File feather edge smooth                             | 150 mm                                                                                        | 4 nos.     |
| 58. | File triangular smooth                               | 200 mm                                                                                        | 8 nos.     |
| 59. | File round second cut                                | 200 mm                                                                                        | 8 nos.     |
| 60. | File square second cut                               | 250 mm                                                                                        | 8 nos.     |
| 61. | Feeler gauge                                         | Gauge Feeler / Thickness - 0.05 mm to 0.3 mm by 0.05 and 0.4 mm to 1 mm by 0.1 mm - 13 leaves | 1 set      |
| 62. | File triangular second cut.                          | 200 mm                                                                                        | 8 nos.     |
| 63. | File hand second cut.                                | 150 mm                                                                                        | 8 nos.     |
| 64. | File card.                                           | 3"x5" size, brass or steel wire                                                               | 8 nos.     |
| 65. | Oil Can                                              | 250 ml                                                                                        | 2 nos.     |
| 66. | Pliers combination insulated                         | 150 mm                                                                                        | 2 nos.     |
| 67. | Wooden handle forged Soldering Iron copper bit.      | 230V, 250 W, 350 gm                                                                           | 2 nos.     |
| 68. | Blow Lamp                                            | 0.5 litre                                                                                     | 2 nos.     |
| 69. | Spanner- Double Ended                                | 6x7, 8x9, 10x11, 12x13, 14x15, 16x17, 18x19, 20x22                                            | 1 set each |
| 70. | Spanner adjustable                                   | 150 mm                                                                                        | 2 nos.     |
| 71. | Interchangeable ratchet socket set                   | 12 mm driver, sized 10-32 mm set of 18 socket & attachments.                                  | 1 set      |
| 72. | Double Ended tubular Box spanner set with Tommy bar. | A/F 6-25 mm set of 10 Tommy Bar Dia 6, 8, 10, 12, 14, 16                                      | 1 set      |
| 73. | Scraper flat                                         | 150 mm                                                                                        | 8 nos.     |

*Operator (Steel Plant)*

|     |                                                                                          |                                                                                       |            |
|-----|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------|
| 74. | Chisel cold flat                                                                         | 9 mm X 100 mm                                                                         | 8 nos.     |
| 75. | Combination Plier Insulated                                                              | 200 mm                                                                                | 4 Nos.     |
| 76. | Screw Driver Insulated                                                                   | 4mm X 150 mm, Diamond Head                                                            | 4 Nos.     |
| 77. | Screw Driver Insulated                                                                   | 6mm X 150 mm                                                                          | 4 Nos.     |
| 78. | Electrician screw driver thin stem insulated handle                                      | 4mm X 100 mm                                                                          | 4 Nos.     |
| 79. | Neon Tester                                                                              | 500 V                                                                                 | 4 Nos.     |
| 80. | Wire Cutter and Stripper                                                                 | 150 mm                                                                                | 4 Nos.     |
| 81. | Relay-<br>a. Cut out Relays<br>b. Reverse current<br>c. Over current<br>d. Under voltage | a. 16A, 440V<br>b. 16A, 440V<br>c. 16A, 440V<br>d. 360V-440V                          | 1 No. each |
| 82. | Series Test Lamp                                                                         | 230V, 60W                                                                             | 4 Nos.     |
| 83. | Miniature Breaker                                                                        | 16 amp                                                                                | 2 Nos.     |
| 84. | MCCB                                                                                     | 100Amps, Triple pole                                                                  | 1 No.      |
| 85. | Fuses                                                                                    | HRC<br>Glass<br>Rewire Type                                                           | 3 Each     |
| 86. | Digital Multi Meter                                                                      | DC 200mv -1000v, 0 – 10A & AC 200mv- 750v , 0-10A, resistance 0-20 MΩ and 3 1/2 digit | 2 Nos.     |
| 87. | 3- point D.C. Starter                                                                    | For 2.5 KW DC motor                                                                   | 1 No.      |
| 88. | 4- point D.C. Starter                                                                    | For 2.5 KW DC motor                                                                   | 1 No.      |
| 89. | Vice bench                                                                               | 150 mm                                                                                | 20 nos.    |
| 90. | Bench working.                                                                           | 2400 x 1200 x 900 mm                                                                  | 4 nos.     |
| 91. | Almirah.                                                                                 | 1800 x 900 x 450 mm                                                                   | 2 nos.     |
| 92. | Lockers with 8 drawers (standard size).                                                  | One locker for each trainee                                                           | 3 nos.     |
| 93. | Metal rack                                                                               | 1820 x 1820 x 450 cm                                                                  | 1 no.      |

**F. LIST OF ADDITIONAL TOOLS FOR ALLIED TRADE IN WELDING**

|     |                                                                                                                      |                             |        |
|-----|----------------------------------------------------------------------------------------------------------------------|-----------------------------|--------|
| 94. | Oxy - acetylene gas welding set equipment with hoses, Oxygen & Acetylene cylinders, regulator and other accessories. |                             | 1 Set. |
| 95. | Gas welding table with positioner with Fire Bricks                                                                   | 900 X 600 X 750 mm          | 1 No   |
| 96. | Welding torch tips of different sizes for Oxy - acetylene gas welding                                                | To fit nozzel no. 1, 2, & 3 | 1 Set  |

*Operator (Steel Plant)*

|      |                                                    |                       |          |
|------|----------------------------------------------------|-----------------------|----------|
| 97.  | Gas lighter.                                       |                       | 2 Nos    |
| 98.  | Trolley for gas cylinders.                         |                       | 1 No     |
| 99.  | Chipping hammer.                                   |                       | 2 Nos    |
| 100. | Gloves (Leather)                                   |                       | 2 Pairs  |
| 101. | Leather apron.                                     |                       | 2 Nos    |
| 102. | Spindle key for cylinder valve.                    |                       | 2 Nos.   |
| 103. | Welding torches.                                   | Nozzles no. 1, 2, & 3 | 1 Set.   |
| 104. | Welding goggles                                    |                       | 4 Pairs. |
| 105. | Welding helmet with coloured flame retardent glass |                       | 2 Nos.   |
| 106. | Tip cleaner                                        |                       | 5 Sets.  |

**G. LIST OF TOOLS & ACCESSORIES FOR PNEUMATICS AND HYDRULICS**

|      |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                       |        |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 107. | Compressor unit                                                                                                                                                                                                  | suitable for Pressure: 8 bar, Delivery: 50 lpm (or more), Reservoir capacity: 24 Litres (or more), 230V, 50 Hz, with pressure regulator and water separator                                                                                                                                           | 1 No.  |
| 108. | Pneumatic Workstation with 40 square mm aluminium profile legs, wooden work surface, and one pedestal drawer unit having 5 drawers, each with handles and individual locks, on metallic full panel drawer slide: | (1) Work Table – Size(Approx.) L1200mmXW900mmXH900mm, with four castor wheels including two lockable wheels at the front side, (2) Drawer – Size (Approx.) – L460mmxW495mm xH158mm each, and overall size of Drawer unit (Approx.) - L470mmxW495mmxH825mm and (3) Drawer slide height (Approx.) 85mm. | 1 No   |
| 109. | Carrier for mounting components, such as PB & relay boxes.                                                                                                                                                       |                                                                                                                                                                                                                                                                                                       | 1 No   |
| 110. | Cut section model for pneumatic components                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                       | 1 set  |
| 111. | Hydraulic Trainer Kit, each consisting of the following matching components and accessories:                                                                                                                     |                                                                                                                                                                                                                                                                                                       | 01 set |
| 112. | I. Hydraulic Power pack                                                                                                                                                                                          | with (1) external gear pump having a delivery rate of 2.5 lpm, (approx.) @ 1400 rpm                                                                                                                                                                                                                   | 1 No.  |

*Operator (Steel Plant)*

|      |                                                                                                |                                                                                                                                                                                                                                                                                                        |        |
|------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
|      |                                                                                                | operating pressure 60 bar, coupled to a single-phase AC motor (230 V AC) having start capacitor and ON/OFF switch and overload protection, (2) pressure relief valve adjustable from 0 – 60 bar, (3) oil reservoir, ≥5 litres capacity having sight glass, drain screw, air filter, and P and T ports. |        |
| 113. | II. Pressure relief valve                                                                      | pilot-operated                                                                                                                                                                                                                                                                                         | 1 No   |
| 114. | III. Drip tray, steel                                                                          | size 1160 mm x 760 mm.                                                                                                                                                                                                                                                                                 | 1 No.  |
| 115. | IV. Pressure Gauge                                                                             | Glycerin-damped, Indication range of: 0 – 100 bar                                                                                                                                                                                                                                                      | 1 No.  |
| 116. | V. Four-Way distributor                                                                        | with five ports, equipped with a pressure gauge                                                                                                                                                                                                                                                        | 1 No.  |
| 117. | VI. Double acting hydraulic cylinder                                                           | with a control cam, Piston diameter 16 mm, Piston rod diameter 10 mm, Stroke length 200 mm.                                                                                                                                                                                                            | 1 No.  |
| 118. | VII. Suitable Weight                                                                           | for vertical loading of hydraulic cylinder                                                                                                                                                                                                                                                             | 1 No.  |
| 119. | VIII. Mounting kit for weight                                                                  | for realizing pulling and pushing load.                                                                                                                                                                                                                                                                | 1 No.  |
| 120. | IX. 3/2-way directional control valve                                                          | with hand lever actuation.                                                                                                                                                                                                                                                                             | 1 No.  |
| 121. | X. 4/2-way directional control valve                                                           | with hand lever actuation.                                                                                                                                                                                                                                                                             | 1 No.  |
| 122. | XI. 4/3-way directional control valve                                                          | closed-centre position, with hand lever actuation.                                                                                                                                                                                                                                                     | 1 No.  |
| 123. | XII. Non-return valve.                                                                         |                                                                                                                                                                                                                                                                                                        | 1 No.  |
| 124. | XIII. Pilot-operated check valve                                                               | pilot to open.                                                                                                                                                                                                                                                                                         | 1 No.  |
| 125. | XIV. One-way flow control valve                                                                | with integrated check valve.                                                                                                                                                                                                                                                                           | 1 No.  |
| 126. | XV. T-Connector with self sealing coupling nipples (2 Nos.) and quick coupling socket (1 No.). |                                                                                                                                                                                                                                                                                                        | 2 Nos. |
| 127. | XVI. Profile plate,                                                                            | Anodised Aluminium, 1100x700 mm, with carriers, mounting frames and mounting accessories (To be fitted onto the Hydraulic workstation)                                                                                                                                                                 | 1 set  |

**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING  
DRAWING**

**TRADE: OPERATOR (STEEL PLANT)**

**LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES**

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

2) **Infrastructure:**

| <b>A : TRAINEES TOOL KIT:-</b> |                                             |                      |                 |
|--------------------------------|---------------------------------------------|----------------------|-----------------|
| <b>Sl. No.</b>                 | <b>Name of the items</b>                    | <b>Specification</b> | <b>Quantity</b> |
| 1.                             | Draughtsman drawing instrument box          |                      | 20+1 set        |
| 2.                             | Set square celluloid 45° (250 X 1.5 mm)     |                      | 20+1 set        |
| 3.                             | Set square celluloid 30°-60° (250 X 1.5 mm) |                      | 20+1 set        |
| 4.                             | Mini drafter                                |                      | 20+1 set        |
| 5.                             | Drawing board (700mm x500 mm) IS: 1444      |                      | 20+1 set        |
| <b>B : Furniture Required</b>  |                                             |                      |                 |
| <b>Sl. No.</b>                 | <b>Name of the items</b>                    | <b>Specification</b> | <b>Quantity</b> |
| 1                              | Drawing Board                               |                      | 20              |
| 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.    |
| <i>Note: - Above Tools &amp; Equipments not required, if Computer LAB is available in the institute.</i> |                                                                                                                                                    |          |

**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                                    |                                 |                        |                      |                   |                        |                                                 |                          |                                    |                             |                     |                        |                                 |              |