CURRICULUM

FOR THE TRADE OF

OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)

UNDER

APPRENTICESHIP TRAINING SCHEME

2017

सत्यमेव जयते
Government of India

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

CONTENTS

1. ACKNOWLEDGEMENT

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1. TATA Steel, Jamshedpur

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2. BACKGROUND

2. 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.

2. 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.

2. 3. Reformation

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

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.

- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.

- Scope has been extended also to non-engineering occupations.

- Establishments have been permitted to outsource basic training in an institute of their choice.

- The burden of compliance on industry has been reduced significantly.

3. RATIONALE

[Need for Apprenticeship in **Operator Rolling Mill Equipments (Long Products)** trade]

1. Examine, inspect, and measure raw materials and finished products to verify conformance to specifications.
2. Adjust and correct machine set-ups to reduce thicknesses, reshape products, and eliminate product defects.
3. Monitor machine cycles and mill operation to detect jamming and to ensure that products conform to specifications.
4. Install equipment such as guides, guards, gears, cooling equipment, and rolls, using hand tools.
5. Position, align, and secure arbors, spindles, coils, mandrels, dies, and slitting knives.
6. Controlling Machines and Processes - Using either control mechanisms or direct physical activity to operate machines or processes (not including computers or vehicles).
7. Operating Vehicles, Mechanized Devices, or Equipment - Running, maneuvering, navigating, or driving vehicles or mechanized equipment, such as forklifts, passenger vehicles.
8. Inspecting Equipment, Structures, or Material - Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.
9. Handling and Moving Objects - Using hands and arms in handling, installing, positioning, and moving materials, and manipulating things.
10. Repairing and Maintaining Electronic Equipment - Servicing, repairing, calibrating, regulating, fine-tuning, or testing machines, devices, and equipment that operate primarily on the basis of electrical or electronic principles.

4. JOB ROLES: REFERENCE NCO

Brief description of Job roles:

The main job responsibilities are as follows:

- Operation and maintenance of reheating furnaces.
- Fuel Mixing
- Mill operation, Mill Setting
- Rolling operation
- Quality Inspection of rolled product.
- Safety & emergency situations.
- Trimming and shearing principles.

5. GENERAL INFORMATION

1. **Name of the Trade : OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)**

2. **N.C.O. Code No.** : **8122.20**

3. **Duration of Apprenticeship Training (Basic Training + Practical Training):** 15 Months

4. **Duration of Basic Training**: -

a) Block –I : 3 months

Total duration of Basic Training: 3 months

5. **Duration of Practical Training (On -job Training): -**

a) Block–I: 12 months

Total duration of Practical Training: 12 months

6. **Entry Qualification** : Passed 10th Class Examination

7. **Selection of Apprentices:** The apprentices will be selected as per Apprentices Act amended time to time.

8. **Rebate for ITI passed trainees** : NIL

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.

6. COURSE STRUCTURE

Training duration details: -

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

Components of Training ⬇	Duration of Training in Months ➡														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Basic Training Block - I															
Practical Training Block - I															

7. SYLLABUS

7.1 BASIC TRAINING

(BLOCK – I)

DURATION: 03 MONTHS

GENERAL INFORMATION

1) **Name of the Trade** : **OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)**
2) **Hours of Instruction** : 500 Hrs.
3) **Batch size** : 20
4) **Power Norms** : 3 KW for Workshop
5) **Space Norms** : 70 Sq. m.
6) **Examination** : The internal assessment will be held on completion of each Block.
7) **Instructor Qualification** :

i) Degree/Diploma in **Mechanical** Engg. from recognized university/Board with one/two year post qualification experience respectively in the relevant field.

OR

ii) NTC/NAC in the trade of **Operator Rolling Mill Equipments (Long Products)** with three year post qualification experience in the relevant field.

Preference will be given to a candidate with Craft Instructor Certificate (CIC)

8) **Tools, Equipments & Machinery required**: - As per Annexure – I

7.1.1 DETAIL SYLLABUS OF CORE SKILL

A. Block– I
Basic Training

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
		30		**20**
1.	Introduction to Engineering drawing, its importance and uses in engineering fields. Simple definitions of Points, Lines, Parallel straight lines.		Applied workshop problems involving simple addition, subtraction, multiplication, division and common fractions.	
2.	Geometrical construction of Square, Rectangle, Triangle, Circle, Polygons, etc.		Science- Definition, Nomenclature, various branches, significance and definitions of important terms.	
3.	Drawing different types of lines.		Rounding of decimal values, use of approximation.	
4.	Free hand sketch of Hand tools used in the trade.		Units – Definition, fundamental & derived units, system of units- FPS, CGS, MKS and SI units of some important parameters- Length , mass, time, density, current, voltage, pressure etc. Unit conversion.	
5.	Screw Threads – Forms of Various Screw threads used in general in the industry – Nomenclature, convention		Workshop problems related to average.	
6.	Fastening Devices – Temporary and Permanent. Meaning and difference. Temporary Device – Hexagonal Bolt, Nut, Check Nut, Washer.		Workshop problems related to percentage.	
7.	Different Methods of Preventions of rotation of Bolts - Check nut, Square headed bolt, Square headed bolt with square neck, cup headed bolt, Eye bolt, counter sunk headed bolt, rag bolt, etc.		Workshop problems related to ratio and proportion.	
8.	Different Methods of locking of nuts :- a) Lock nuts, b) Split pin, c) Slotted nut , d) Symmonds nut, e) Castle nut**, f**) Wings nut, etc.		Workshop problems related on time & work.	
9.	Permanent Fastening Devices- Rivets – different parts and their types Different types of rivet heads.		Profit & Loss and problems concerning to workshop practices.	

10.	Rivets Joints – Lap joint and Butt or Strap joint. Lap Joint – a) Single Riveted, b) Double riveted, i) Chain, ii) zig – zag Butt Joint – a) Single plate or strap, b) Double plate or strap		Properties of Matter- Different types of Properties of Matter e.g. Mechanical, Electrical, Chemical, Magnetic.	
11.	Keys and Cotter Joints, Difference between Keys and Cotters, Different types of Keys.		Properties of Matter (Mechanical) - Tenacity, Toughness, Malleability, Ductility, Elasticity, Plasticity, Brittleness, Hardness (concept & definition)	
12.	---		Properties and uses of copper, zinc, lead, tin, aluminum, brass, bronze, solder, bearing metals, timber, and rubber.	
13.	---		Engineering Material- Introduction, classification, Metallic- Non metallic material, physical and mechanical properties,	
14.	---		Heat & temperature- Definition and its importance. Scales of Temperature, e.g. Fahrenheit, Centigrade, Kelvin- relationship between them.	
15.	---		Transmission of heat- Conduction, Convection and Radiation. Examples from Industries (concept & definition)	
16.	---		Transmission of Power and motion of Belt and Pulleys:- Driver and Follower – Open and Cross belt system of belt drives. Velocity ratio. Power Transmission by belt – Problems	

7.1.2 DETAIL SYLLABUS OF PROFESSIONAL SKILLS & PROFESSIONAL KNOWLEDGE

A. Block –I

Basic Training

Week No.	Professional Skills	Professional Knowledge
1.	Safety: - its importance, classification, personal, general, workshop and job safety. Occupational health and safety. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Importance of housekeeping & good shop floor practices. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Fire& safety: Use of Fire extinguishers. Safety regarding working with different types of steam and its First-Aid. Drill on fire fighting & safety	Safety Precautions to be followed at site. Fire precautions causes and types of fire, precaution against outbreak of fire. Fire extinguisher types and uses. Proper centering erection, proper scaffolding making & precautions to be taken while working at higher attitudes and during hot repair. Precautions to be followed in Gas hazardous area. Precaution during dismantling.
2.		**Induction & Safety Training** Company Profile, Significance of Steel Business Plant familiarization, Layout, Product Mix, Objectives. Safety, Health & Environment Awareness Basic skill development training on Fitting, Use of Tools, Measuring Instruments, Coupling & Alignment, Welding, Gas Cutting.
3.	**Video demo of the related processes**	**Overview of Rolling Mills** • Concept of Rolling, Types of Rolling Mills, Types of Rolling (Hot & Cold), • Types of Rolled Products, Various Techno-economic parameters • Shop Specific Safety measures.
4.	**Video demo of process technology.**	**Process Technology** • Introduction to different mills e.g. Blooming Mill, Billet Mill, Section Mill, Merchant Mill, Skelp Mill, Wire Rod Mills, Rail Mill & Roll Shop. • Rolling Mills Sections

		a. Reheating Furnaces b. Mill Operations c. Roll Building (operations). Roll Setting & Adjustments d. Guard /Guide Making/Setting e. Template Making f. Straightening Machine Operation, Inspection & Detection of Defects and Despatch of materials.
5.	**video demo of the reheating furnace processes**	**Reheating Furnace** a) Safety precautions to be taken during Furnace operation. b) Understanding different types of Furnaces. c) Functions of different parts of a Furnace. d) Different types of fuels used in various Furnaces.
6.	Practice on drive of reheating furnace.	**Reheating Furnace** e) Materials to be heated inside the furnace for different mills. f) The Entry and Exit temperature of material. g) Principle of charging & discharging of furnace. h) The controlling parameters to maintain the inside temperature of the furnace. i) Importance of cleaning different parts of the furnace and housekeeping.
7.	**video demo of the mill operating processes**	**Mill Operations** a) Safety precautions to be taken for Mill operations b) The points to check during Roll assembly in different mills. c) Functions of pulpit operations. d) Points to check during pulpit operation. e) Function of Rapid Quenching process f) Finishing procedure: Heat treatment, Cutting & Bundling operation, Colour coding & Inspection g) Importance of cleaning / lubrication of different parts and housekeeping.
8.	**video demo of the roll operations processes**	**Roll Building Operations** 1) Safety precautions to be taken for Roll Building. 2) Points to be checked during Roll assembling in different mills. 3) Functions of Guide and stripper guards. 4) Points to be checked during Roll Building. 5) Importance of cleaning / lubrication of different parts and housekeeping. 6) Hammering technique.
9.	**video demo of the guide & guard processes**	**Guide & Guard Making** a) Safety precautions to be taken for Guide &

		Guard making. b) Digital measuring instruments. c) Importance of grinder and spirit level. d) Understanding of Guard line and its implication e) Understanding Basics of guard drawing. f) Understanding Type of grinding wheel and its implications. g) Understanding Type of vice and how to set it. h) Holding Grinding machine during grinding. i) Parameters to be checked while fitting the guard on Roll Pass j) Importance of cleaning/lubrication of different parts and housekeeping.
10.	Practice on template making.(Involving different safety precaution, marking, measuring and other related operations)	**Template Making** a) The safety precautions to be followed while filing the template. b) Construction ,use, function and type of marking, measuring & cutting tools such as vices , hammers, hacksaw, files, drill, scriber, steel rule & digital instruments. c) Elementary details of Roll Pass Drawing d) Type of Template used in Roll Shop, inspection of template & criteria for rejection. e) Template making Technique f) Understanding Type of vice and how to set it. g) Importance of cleaning / lubrication of different parts and housekeeping
11.	**video demo of the related skills**	**Straightening Machine Operation** 1. The safety precautions to be followed for straightening operation. Maintaining specified tolerance for straightness. 2. Aligning of Rolls after changing the section. 3. Co-ordination by Straightener for a. two bars not released simultaneously on outgoing side. b. safe movement of people on outgoing side. c. matching the speed of entry at ingoing with the speed of removal at outgoing side. 4. Taking first bar at slow speed. 5. Keeping all same size Rolls together in one place. 6. Dressing all same size Rolls in a single set in Roll Shop. 7. Using Hammer for tightening / opening Lock nut and Ring nut. 8. Using Sample piece for fixing liners in between Roll pairs for Out of Square adjustment.

12.	**Video demo of finishing & despatch of materials process.**	**Finishing & Despatch of Materials** 1. Safety precautions to be followed during dispatch of material. 2. Understanding of materials as per dimensions and quality. 3. To understand the dispatch procedures as per the requirement of the Customer. 4. To understand the Stack Card System and maintenance of the same to facilitate loading activities. 5. To understand the basics of system for Despatch module
13.	**Revision & Internal Assessment**	

7.1.3 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1)	**Name of the subject**	**:**	**EMPLOYABILITY SKILLS**
2)	**Applicability**	**:**	ATS- Mandatory for fresher only
3)	**Hours of Instruction**	**:**	**110 Hrs. (55 hrs. in each block)**
4)	**Examination**	**:**	The examination will be held at the end of two years Training by NCVT.
5)	**Instructor Qualification**	**:**	

i) MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12th /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGET Institute.

7.1.3.1 SYLLABUS OF EMPLOYABILITY SKILLS

A. Block – I
Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	**15**
1	**Pronunciation :** Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)	
2	**Functional Grammar** Transformation of sentences, Voice change, Change of tense, Spellings.	
3	**Reading** Reading and understanding simple sentences about self, work and environment	
4	**Writing** Construction of simple sentences Writing simple English	
5	**Speaking / Spoken English** Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.	
	I.T. Literacy	**15**
1	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2	**Computer Operating System** Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.	
3	**Word processing and Worksheet** Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets	
4.	**Computer Networking and INTERNET** Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page	

	and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.	
	Communication Skill	**25**
1	**Introduction to Communication Skills** Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body - language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort. Case study/Exercise	
2	**Listening Skills** Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.	
3	**Motivational Training** Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning. Case study/Exercise	
4	**Facing Interviews** Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
5	**Behavioral Skills** **Organizational Behavior** Problem Solving Confidence Building Attitude Decision making Case study/Exercise	
	Entrepreneurship skill	**15**
1	**Concept of Entrepreneurship** **Entrepreneurship**- Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	

2	**Project Preparation & Marketing analysis** Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of Product Life Cycle (PLC), Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.	
3	**Institutions Support** Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.	
4	**Investment Procurement** Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.	
	Productivity	**10**
1	**Productivity** Definition, Necessity, Meaning of GDP.	
2	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3	**Comparison with developed countries** Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.	
4	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	**15**
1	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4	**First Aid** Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
5	**Basic Provisions** Idea of basic provision of safety, health, welfare under legislation of India.	
6	**Ecosystem** Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.	
7	**Pollution** Pollution and pollutants including liquid, gaseous, solid and hazardous waste.	
8	**Energy Conservation** Conservation of Energy, re-use and recycle.	

9	**Global warming** Global warming, climate change and Ozone layer depletion.	
10	**Ground Water** Hydrological cycle, ground and surface water, Conservation and Harvesting of water	
11	**Environment** Right attitude towards environment, Maintenance of in -house environment	
	Labour Welfare Legislation	**5**
1	**Welfare Acts** Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.	
	Quality Tools	**10**
1	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2	**Quality Circles :** Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	
3	**Quality Management System :** Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.	
4	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
5	**Quality Tools** Basic quality tools with a few examples	

7.2 PRACTICAL TRAINING (ON-JOB TRAINING)
(BLOCK – I)
DURATION: 12 MONTHS

GENERAL INFORMATION

1) **Name of the Trade** : **OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)**

2) **Batch size** : a) Apprentice selection as per Apprenticeship guidelines.
b) Maximum 20 candidates in a group.

3) **Examination** : i) The internal assessment will be held on completion of each block
ii) NCVT exam will be conducted at the end of 2nd year.

4) **Instructor Qualification** :

i) Degree/Diploma in **Mechanical** Engg. from recognized university/Board with one/two year post qualification experience in the relevant field.

OR

ii) NTC/NAC in the trade of **Operator Rolling Mill Equipments (Long Products)** with three year post qualification experience in the relevant field.

Preference will be given to a candidate with Craft Instructor Certificate (CIC)

5) **Infrastructure for On-Job Training** : - As per Annexure – II

7.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

A. BLOCK – I
DURATION: 12 MONTHS

1. **Overview of Rolling Mills**

- Concept of Rolling, Types of Rolling Mills, Types of Rolling (Hot & Cold),
- Types of Rolled Products, Various Techno-economic parameters, Shop Specific Safety measures.

2. **Process Technology (Rolling Mills)**

- Introduction to different mills e.g. Blooming Mill, Billet Mill, Section Mill, Merchant Mill, Skelp Mill, Wire Rod Mills, Rail Mill & Roll Shop.
- Rolling Mills Sections
    a. Reheating Furnaces
    b. Mill Operations
    c. Roll Building (operations). Roll Setting & Adjustments
    d. Guard /Guide Making/Setting
    e. Template Making
    f. Straightening Machine Operation, Inspection & Detection of Defects and Despatch of materials.

3. **Reheating Furnace**

- Introduction to different types of Furnaces.
- Operating Practice of Charging & Discharging of Materials from the Furnace.
- Judging temperature of materials inside the Furnace.
- Operating procedure of Pusher Bar in the Furnace.
- Furnace lighting up and closing down procedure.
- Demonstration on control of the inside temperature of Furnace.
- Different types of Instruments used for temperature measurement, pressure control etc.
- Cleaning different parts of the furnace and maintaining good housekeeping.

4. **Mill Operations**

- Safety precautions for Mill Operations.
- Check points during Roll assembling in different mills for smooth rolling.
- Operating procedure of different pulpits.
- Checking various points for pulpit operation.

- Demonstration on Rapid Quenching process, Heat treatment, Cutting & Bundling operation, Colour coding & Inspection
- Cleaning / Lubricating different parts and maintaining good housekeeping

5. **Roll Building Operations**

- Safety precautions for Roll Assembling and Roll Building.
- Points to be checked during Roll assembling in different mills for smooth rolling.
- Setting the bearing, cramp bars, guides and guards of different mills.
- Checking all the points for roll building.
- Cleaning / lubrication of different parts and maintaining good housekeeping.
- Hammering technique.

6. **Guide & Guard Making**

- Safety precautions for Guide & Guard making.
- Grinding machine operation
- Understanding of guard dimension i.e. Heel Height, Guard length
- Doing leveling, alignment and adjustment of dummy cramp bar.
- Grinding Wheel Changing technique from grinder.
- Vice Setting technique and Supporting equipment.
- Cleaning / lubrication of different parts and maintaining good housekeeping.

7. **Template Making**

- Safety precautions for Guide & Guard making.
- Marking of lines and curve.
- Flatness checking practice of the surface.
- Hack saw cutting Practice.
- Using of Scriber, Marking/draw the Template drawing of different section on slate.
- To ensure development of knowledge & Skill to finish the Template
- Clean/lubricate different parts and maintain good housekeeping.
- Inspection of template.

8. **Straightening Machine Operation**

- Observing the Safety precautions while operating Straightening m/c.
- Maintaining the safety of the equipment.
- Information exchange during shift changeover
- Stacking of different rolls after removal from m/c.
- Emergency procedure.

- Post roll changing procedure.
- Rectification of defects like
    a. sweep.
    b. out of square.
    c. camber.
- Roll changing procedure.
- Hammering technique.

9. **Finishing & Despatch of Materials**

- Observing the Safety precautions during Dispatch.
- Implementation of dispatch procedures including slinging / deslinging of materials, safety precautions, material identification, marking, colour coding and adjustment of wagons.

ASSESSMENT STANDARD

8.1 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 to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarp/wastage as per procedure, behavioral attitude and regularity in training.

The following marking pattern to be adopted while assessing:

a) Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For 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.

In this work there is evidence of:

- demonstration of good operational skills while executing the assigned job.
- different accuracy achieved while undertaking different skills demanded by the job.
- a fairly good level of neatness and consistency in handling controls.
- occasional support in completing the project/job.

b) Weightage in the range of above75%- 90% to be allotted during assessment under following performance level:

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.

In this work there is evidence of:

- good skill levels in operation while executing the assigned job.
- the majority of the accuracy achieved while undertaking different skills demanded by the job.
- a good level of neatness and consistency in handling controls.
- little support in completing the job.

c) Weightage in the range of above 90% to be allotted during assessment under following performance level:

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.

In this work there is evidence of:

- high skill levels in operation while executing the assigned job.
- accuracy while undertaking different work being substantially in line with those demanded by the job.
- a high level of neatness and consistency in the finish.
- minimal or no support in completing the project

8.2 FINAL ASSESSMENT- ALL INDIA TRADE TEST FOR APPRENTICE

SUBJECTS	**Marks**	**Sessional Marks**	**Full Marks**	**Pass Marks**	**Duration of Exam.**
Practical	300	100	400	240	08 hrs.
Trade Theory	100	20	120	48	3 hrs.
Workshop Cal. & Sc.	50	10	60	24	3 hrs.
Engineering Drawing	50	20	70	28	4 hrs.
Employability Skill	50	-	50	17	2 hrs.
Grand Total	**550**	**150**	**700**	**-**	

Note: - The candidate pass in each subject conducted under all India trade test.

8. FURTHER LEARNING PATHWAYS

Employment opportunities:

On successful completion of this course, the candidates may be gainfully employed in the following industries:

1. Manufacturing & Process industries like steel plant and other related industries etc.

ANNEXURE – I

TOOLS & EQUIPMENT FOR BASIC TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TRADE: OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)

LIST OF TOOLS & EQUIPMENTS FOR 20 APPRENTICES

As per training need the tools & equipment may be procured.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)

LIST OF TOOLS & EQUIPMENTS FOR 20 APPRENTICES

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

2) Infrastructure:

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Draughtsman drawing instrument box	20 Nos.
2.	Set square celluloid 45^0 (250 X 1.5 mm)	20 Nos.
3.	Set square celluloid 30^0-60^0 (250 X 1.5 mm)	20 Nos.
4.	Mini drafter	20 Nos.
5.	Drawing board (700mm x500 mm) IS: 1444	20 Nos.

B : FURNITURE REQUIRED

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

ANNEXURE – II

INFRASTRUCTURE FOR ON-JOB TRAINING

TRADE: OPERATOR ROLLING MILL EQUIPMENTS (LONG PRODUCTS)

For Batch of 20 APPRENTICES

Actual training will depend on the existing facilities available in the establishments. However, the industry should ensure that the broad skills defined against On-Job Training part (*i.e. 12 months*) are imparted. In case of any short fall the concern industry may impart the training in cluster mode/ any other industry/ at ITI.

ANNEXURE-III

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1. Due care to be taken for proper & inclusive delivery among the batch. Some of the following some method of delivery may be adopted:

A) LECTURE
B) LESSON
C) DEMONSTRATION
D) PRACTICE
E) GROUP DISCUSSION
F) DISCUSSION WITH PEER GROUP
G) PROJECT WORK
H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.