CURRICULUM

FOR THE TRADE OF

OPERATOR BLAST FURNACE IRON MAKING EQUIPMENTS

UNDER

APPRENTICESHIP TRAINING SCHEME

2017

सत्यमेव जयते
Government of India

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

CONTENTS

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1. TATA Steel, Jamshedpur

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

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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 Blast Furnace Iron Making Equipments** trade)

1. Use of stock distributor for uniform distribution of burden materials along the circle of the large bell of blast furnace charging device.
2. Able to charging and uniform distribution of burden in the blast furnace.
3. Use of electrical bell control winch for lifting and forced lowering of Blast Furnace bell.
4. Operation of various equipment i.e. charging equipment, Stoves, septum valve, bleeder valve, Primary Dust Catcher valve, hot blast valve, Snort valve etc.
5. Checking of oil levels in mud gun & drill machine, availability of sufficient clay for mud gun,
6. Operate machine for iron tap−holes opening and checking of Tap hole face condition,
7. Filling of mud gun clay, cleaning of metal –slag runner, runner preparation, sample taking, poking, lancing, Rocking Runner operation etc.

4. JOB ROLES: REFERENCE NCO

Brief description of Job roles:

Operate and maintain the iron making (Blast Furnace) equipment efficiently and safely. The main jobs are follows:

- Stock house operation, batching & screening, charging
- Control room operation
- Cast house preparation & operation
- Tapping & closing of tap hole i.e., tapping practice.
- Slag granulation.
- G.C.P equipment & operation.
- Safe working practice etc.

5. GENERAL INFORMATION

1. **Name of the Trade** **: OPERATOR BLAT FURNACE IRON MAKING EQUIPMENTS**

2. **N.C.O. Code No.** : **8121.15, 8223.60**

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 Apprenticeship 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 BLAST FURNACE IRON MAKING EQUIPMENTS**
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 Blast Furnace Iron Making Equipments** 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.	Importance of safety and general precautions observed in the 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. Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE). Response to emergencies e.g.; power failure, fire, and system failure. Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid. Introduction to 5S concept & its application. Fire: - Types, causes and prevention methods. Fire Extinguisher, its types. Define environment, environment Pollution, Pollutants, type of Pollution (Air pollution, water pollution, soil pollution noise pollution, thermal pollution, radiation. Global warming its causes and remedies. Industrial Waste its types, sources and waste Management.
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 use of Tools, basic Measuring Instruments, Coupling & Alignment, Welding, Gas Cutting.
3.	**Video demo of Blast furnace & related safety process.**	**Overview of Blast Furnace & Related Safety Aspects** - Overview of Blast Furnace i.e. Blast Furnace Iron making process flow, technical details of Blast Furnaces, important operating parameters etc.

		- Different sections of Blast Furnace & their functions - General safety & Gas safety - Fire fighting system - Hazards in Blast Furnace - Shut down procedures - Handling of emergency situations - Role of Refractory Bricks
4.	**Video demo of housekeeping and environmental pollution control process.**	**HOUSE KEEPING & ENVIRONMENTAL POLLUTION CONTROL** - Importance of housekeeping & environmental pollution control - Factors affecting environment - Opportunities to control **STOCK HOUSE & HIGHLINE** - Introduction to various equipments in Stock House & Highline i.e. Bunker, Belt Conveyors, Screens, Weigh Hoppers, Skip Car etc. - Process flow & technical details - Important operational parameters & check points - Safety aspects - (Personal & equipment) - Various Standard Operating Practices to be followed - Communication system - Handling of emergency situations i.e. Failure of belt conveyors, Break down of Sinter Fines Belts, PLC system failure, Break down of Coke screen etc
5.	**Video demo of furnace proper process.** Practice on Furnace process flow & technical details.(Involving different stoves, top charging equipment, hot blast etc.)	**FURNACE PROPER** - Overview of Blast Furnace process flow & technical details - Important equipment & their functions i.e. Stoves, Top charging equipment, Hot blast valves, bleeder valve, septum valve, snort valves, Tuyeres, back draft valves etc. - Important operational parameters & their control - Important check points - Safety aspects (Personal & equipment) - Various Standard Operating Practices to be followed especially OFF blast & ON blast activities - Co-ordination with concerned sections & departments - Handling of emergency situations - i.e. Power failure, blower failure, cooling

		water line failure, equipment failure etc.
6.	**Video demo of cast house process.**	**CAST HOUSE** - Introduction to important equipment in cast house -their function and technical details i.e. Mud gun, Drill Machine, Cast House crane, Rocking runner, Pusher car, skimmer plate etc. - Major activities to be done i.e. Inspection & filling of mud gun, cleaning & preparation of metal runner, slag runner etc - Safety aspects (Personal & Equipment) - Various Standard Operating Practices to be followed - Communication system - Handling of emergency situation i.e. Cast opening problem, Rocking runner tripping, Pusher car failure, Auto by-pass cut, cleaning & preparation of slag runners etc.
7.	Practice on cast house slag granulation process.(Involving different flow slag, granulation process etc.)	**CAST HOUSE SLAG GRANULATION PROCESS** - Overview & process flow Slag Granulation Process - Major equipment & technical details i.e. Granulation Mechanism, Granulation tank, Dewatering system, Pumps, conveyors, screens, feeders etc. - Important operational parameters & their control - Important check points - Major operational activities to be done i.e. Cleaning & inspection - Safety aspects - (Personal & Equipment) - Various Standard Operating Practices to be followed - Communication system - Handling of emergency situations i.e. Power failure, major equipment failure due to Mechanical problem, belt conveyor failure, pump failure etc.
8.	Practice on Gas cleaning plant.	**GAS CLEANING PLANT** - Overview of Gas Cleaning system – Process flow & technical details - Overview of GCP water recirculation system & slurry disposal system - Important equipment in Gas Cleaning plant and their function i.e. Primary Dust Catcher, Secondary dust catcher,

		Scrubber, Demister, Semi Clean gas line, Electro Static Precipitators, GCP Pumps etc. - Important parameters & check points - Major operational activities done in shop floor & control room - Safety aspects (Personal & Equipment) - Gas Safety devices & their application - Various Standard Operating Practices to be followed - Communication system - Handling of emergency situations i.e. Power failure, water line leakages, Pump Failure, Gas line leakages etc.
9.	**Video demo of BF-cooling water recirculation system process.**	**BF –COOLING WATER RECIRCULATION SYSTEM** 1. Process flow & technical details of water recirculation system 2. Various pumps, valves & their functions 3. Important parameters & check points 4. Major operational activities done 5. Safety aspects (Personal & Equipment) 6. Various Standard Operating Practices to be followed 7. Communication system 8. Handling of emergency situations i.e. Power failure, water line leakages, Pump Failure etc.
10.	**Video demo of coal dust/ tar injection system process.**	**COAL DUST/ TAR INJECTION SYSTEM** 1. Overview of Coal Dust/ Tar Injection system- Process flow & technical details 2. Major equipment in Coal Dust/Tar Injection system & their functions i.e. centrifugal compressor, Screw compressor, high rise conveyor, hot gas generator, grinding mill, distributor, bag filter, Tar injection system Pumps etc. 3. Important operational parameters & check point 4. Major operational activities done 5. Safety aspects (Personal & Equipment) 6. Various Standard Operating Practices to be followed 7. Communication system

		8. Handling of emergency situation i.e. Power failure, equipment failure etc.
11.	**Video demo of PIG casting machine process.** Practice on PIG casting machine process.(Involving different pig moulds, conveyor chain, lime spray equipment etc.)	**PIG CASTING MACHINE** 1. Overview of Pig casting process- process flow & technical details 2. Major equipment and their functions i.e. Ladle Tilters, Pouring house, Pig moulds, conveyor chain, Lime spray equipment, wagon winch, storage yard etc. 3. Important tools & tackles required in operation i.e. Hammers, hooks, shovels, lancing pipes etc. 4. Important parameters & check points 5. Safety aspects (Personal & Equipment) 6. Various Standard Operating Practices to be followed 7. Communication system 8. Handling of emergency situations i.e. Equipment failure & Power failure during operation **LADLE REPAIR SHOP** 1. Function of Ladle repair shop 2. Major equipment & their functions 3. Important tools & tackles required 4. Safety aspects (Personal & Equipment) 5. Various Standard Operating Practices to be followed 6. Communication system 9. Handling of emergency situation

12.	**Video demo of centralized compressed air station & power plant (turbo blower) process.**	**CENTRALISED COMPRESSED AIR STATION** 1. Overview & process flow of Compressed air station- technical details 2. Major equipment & their functions in Compressed air station i.e. Compressors, cooling water recirculation system, receivers, Nitrogen manifolds, pipe lines etc. 3. Important parameters & their control 4. Important check points 5. Safety aspects (Personal & Equipment) 6. Various Standard Operating Practices to be followed 7. Communication systems 8. Handling of emergency situations i.e. Power failure, equipment failure etc. **POWERPLANT (TURBO BLOWER) OVERVIEW** 1. Overview & Process flow 2. Important operating parameters 3. Relation with Blast Furnace operation 4. Communication system 5. Handling of emergency situations i.e. Power failure, Equipment failure etc. **TECHNICAL CELL** 1. Function of Technical cell 2. Overview of Quality parameters 3. Availability & storage of tools & tackles 4. Communication system
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 BLAST FURNACE IRON MAKING EQUIPMENTS**

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 Blast Furnace Iron Making Equipments** 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 Blast Furnace & Related Safety Aspects: -**
   - Use of general safety appliances i.e. helmet, hand gloves etc.
   - Use of Cast house safety appliances i.e. apron, ankle guard etc.
   - Use of gas safety appliances & devices i.e. Gas masks, gas monitors etc.
   - Orientation in different sections of Blast Furnace.
2. **HOUSE KEEPING & ENVIRONMENTAL POLLUTION CONTROL: -**
   - Housekeeping practices in various sections of Blast Furnace
3. **STOCK HOUSE & HIGHLINE: -**
   - Regular & scheduled check up of all important check points
   - Operation of various equipment in stock house & high line i.e. Belt conveyors, screens, weighing system, skip car operation etc.
   - Monitoring bunker position, belt condition, highline condition etc.
   - Monitoring the process flow & filling of log books
   - Cleaning of spillages & removing jams etc.
   - Housekeeping in work place
4. **FURNACE PROPER: -**
   - Regular & scheduled check up of important check points.
   - Operation of various equipment i.e. charging equipment, Stoves, septum valve, bleeder valve, Primary Dust Catcher valve, hot blast valve, Snort valve etc.
   - Monitoring all operational parameters & filling of log sheets.
   - Visual inspection of Tuyeres, valve condition & other check points.
   - OFF blast & ON blast operation
   - Reporting of abnormalities
   - Handling of emergency situations i.e. Power failure, cooling water line failure etc.
5. **CAST HOUSE:-**
   - Usage of proper safety appliances i.e. Safety shoes, helmet, apron, ankle guard, fire glasses, Leg guard etc.
   - Regular & schedule check up of important check points

- Checking of oil levels in mud gun& drill machine, availability of sufficient clay for mud gun, checking of Tap hole face condition, filling of mud gun clay, cleaning of metal –slag runner, runner preparation, sample taking, poking, lancing, Rocking Runner operation etc.
- Housekeeping
- Reporting of abnormalities

6. CAST HOUSE SLAG GRANULATION PROCESS: -

- Usage of safety appliances i.e. safety shoes, helmets etc.
- Regular & scheduled checking of important check points
- Operation of equipment i.e. Drums, Conveyors, recovery pumps, granulation pumps, Lubrication pumps etc.
- Monitoring of operational parameters & filling log sheet/Log book.
- Cleaning & removal of jamming & spillages
- Housekeeping
- Reporting of abnormalities

7. GAS CLEANING PLANT: -

- Usage of general safety appliances & gas safety appliances
- Regular & scheduled checking of important check points
- Dust disposal from Primary & Secondary dust catchers
- Operation of various pumps & valves in GCP pump houses – Isolation, pump changing etc.
- Operation of Electrostatic precipitators (Isolation, charging, flushing)
- Operation of slurry disposal system – thickeners, agitators & slurry disposal pumps, flushing & hosing
- Operation of various gas valves for gas line isolation & charging
- Monitoring of water levels in Cooling Tower, Scrubber, hot sump and overflow control
- Flushing & cleaning of jamming
- Housekeeping
- Reporting of abnormalities

8. BF –COOLING WATER RECIRCULATION SYSTEM: -

- Usage of safety appliances i.e. Safety shoes, helmets, hand gloves etc.
- Regular & scheduled checking of important check points
- Operation of various pumps, cooling tower fans, valves – Isolation & changing
- Monitoring of various parameters i.e. Pump bearing temp, amps, Emergency tank level, water flow rate, line pressure etc. & filling logbooks.
- Housekeeping

- Reporting of abnormality

9. COAL DUST/ TAR INJECTION SYSTEM: -

- Usage of safety appliances i.e. Safety shoes, helmets, hand gloves etc.
- Regular checking of important check points
- Operation of major equipment i.e. centrifugal compressor, Screw compressor, Grinding Mill, Hot gas generator, conveyors, bag filters & Tar injection system.
- Monitoring of various parameters and their control
- Cleaning, flushing & removal of jamming & spillages
- Housekeeping
- Reporting of abnormality

10. PIG CASTING MACHINE: -

- Usage of safety appliances i.e. Safety shoes, helmets, hand gloves etc.
- Regular & scheduled checking of important check points i.e. availability of lime spray equipment, operating condition of tilters & wagon winch etc.
- Operation of equipment & pouring of hot metal in pig casting machines.
- Cleaning & removal of jamming & spillages
- Housekeeping
- Reporting of abnormality

11. LADLE REPAIR SHOP: -

- Usage of safety appliances
- Dismantling of boulders
- Positioning of ladles
- Heating of ladles
- Operation of other equipments
- Housekeeping
- Reporting of abnormalities

12. CENTRALISED COMPRESSED AIR STATION: -

- Usage of safety appliances
- Regular & scheduled checking of important check points
- Operation of compressors, cooling water recirculation systems etc.
- Monitoring of process parameters & their control
- Trouble shooting
- Housekeeping

- Reporting of abnormality

13. POWERPLANT (TURBO BLOWER) OVERVIEW: -

- Orientation of Power Plant, Blower operation

14. TECHNICAL CELL: -

- Checking of available through mass
- Distribution of clay mass to various furnaces
- Reporting of abnormality

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 BLAST FURNACE IRON MAKING EQUIPMENTS

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 BLAST FURNACE IRON MAKING EQUIPMENTS

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 BLAST FURNACE IRON MAKING EQUIPMENTS

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.