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

COMPETENCY BASED CURRICULUM

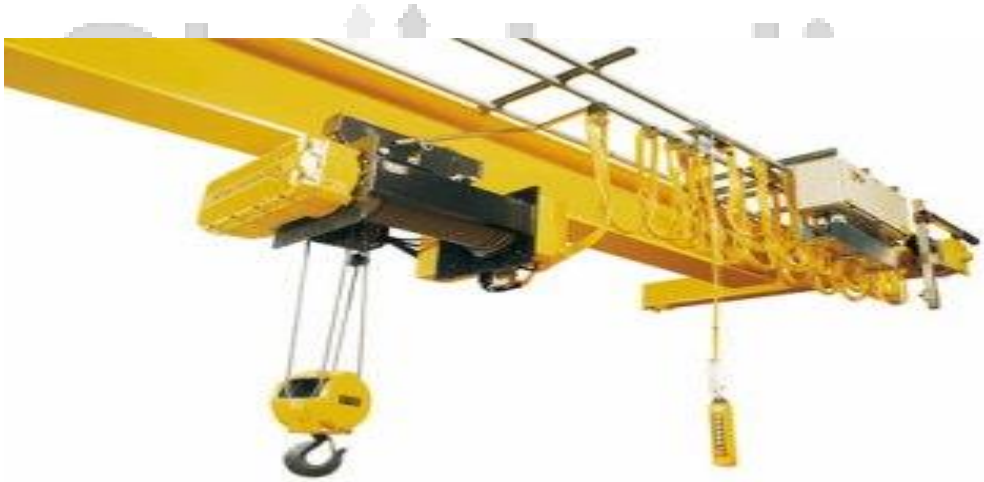
CRANE OPERATOR
(INTEGRATED STEEL PLANT)

(Duration: Six month)

CRAFTMAN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL- 4



SECTOR – CAPITAL GOODS AND MANUFACTURING

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

CRANE OPERATOR (INTEGRATED STEEL PLANT)

(Engineering Trade)

(Designed in 2019)

Version: 1.0

CRAFTSMEN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL - 4

Developed By
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CONTENTS

1. COURSE INFORMATION

Flexi- MoU is one of the pioneer programmes under DGT on the basis of the MoU in between DGT & NISP-NAGARNAR for propagating vocational training to allow industries to take advantage of various schemes for conducting training programme in higher employment potential courses according to needs of industries. The concept of Flexi- MoUs was introduced in June-July 2014. DGT and NISP-NAGARNAR have decided to sign this memorandum of understanding to provide an opportunity to the youth to acquire skills related to CRANE OPERATOR (INTEGRATED STEEL PLANT) through specially designed "Learn and Earn" approach consisting a mix of theoretical and On-the-Job Training (OJT) components and hence improve their employability potential & to contribute in the overall growth of Steel industry by creating a pool of skilled resources.

During the Six months duration, a candidate is trained on subjects Professional Skill, Professional Knowledge, Workshop Calculation & Science, Engineering Drawing and Employability Skills. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task.

The content broadly covers operating a mobile crane to lift, move, position, and reposition loads in different processes of INTEGRATED STEEL PLANT in today's steel industry. The **Six months** course coverage is categorized as below:

The contents covered are safety aspects related to trade, familiarization with integrated steel plant working covering crane operation. The Crane Operator is responsible for operating a mobile crane to lift, move, position, and reposition loads. The Operator controls crane functions by depressing buttons and foot pedals as well as manipulating levers. The Operator will be required to unload crane accessories from trailers or support vehicles. The Operator receives direction from riggers and/or site supervision via verbal or hand signals to determine required load movement. Crane Operators operate various types of cranes: All Terrain, Rough Terrain, Crawlers, Industrial, Hydraulic Trucks, Conventional Trucks, and Boom Trucks; Hydraulic Truck Crane Operators - operate diesel powered cranes which are mounted on truck type chassis, to lift material, objects or personnel into place; Drives crane to work site and properly sets up per the manufacturer's operators manual and company rules regarding cribbing/matting; cribbing blocks or mats as required to perform job requirements of customer. This is followed by on job training in practice in coke ovens and bye product plant ,sintering plant, blast furnaces, steel melting shop, thin slab caster, hot strip mill, raw material handling section power and blowing station and other sections of integrated steel plant.

2. TRAINING SYSTEM

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. DGT is futuristic in preparing the prospective Indian workforce in building skills and capabilities as per the needs of the industry. In this quest, it has changed the paradigm of growth to job oriented training by partnering with industry to be an enabler of responsible, sustainable and inclusive growth. Towards this end, DGT signed this MOU with the NMDC (NISP)

NMDC shall conduct courses at NISP Nagarnar in its training institute. On the job training will be conducted inside the plant premises. It will also ensure the eligible trainees take up Apprenticeship / higher education in suitable streams and shall also guide the students to become Entrepreneurs. NISP will strictly follow the policy guidelines for Flexi - MoU as in place from time to time. No deviation for the same would be permitted. Admission and Exam for trades run under Flexi MoU at training locations of NISP Nagarnar. Theory content to be 25% and practical content to be 75%.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, 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 knowledge, core skills & employability skills while performing the job and maintenance work.
- Check the task/job for functioning, identify and rectify errors in task/job.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS

- Can work as technician –CRANE OPERATOR in any integrated steel plant
- Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC).

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of Six months:

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	150
2	Professional Knowledge (Trade Theory)	100
3	Workshop Calculation & Science	40
4	Engineering Drawing	40
5	Employability Skills	80
	Total	**410 hrs**

On The Job Training; (380 hrs)

Revision and Examination (90 hrs)

Total duration hrs. : 410 + 380 + 90= 880 hrs.

Total training hours:-

Duration	Basic Training	On-Job Training	Revision and Examination	Total
For 6 months course	410 hrs.	380 hrs. Including one day in a week training at Training Institute.	90hrs.	880 hrs.

2.4 ASSESSMENT & CERTIFICATION

I. Conducting training of selected candidates is the sole responsibility of Industrial Training Partner (ITP).
II. Assessment will be jointly done by ITP and DGT. Practical and formative assessment shall be conducted by ITP, and Computer Based theoretical exams shall be conducted by DGT.
III. ITP must refer to the latest examination reform guidelines issued by DGT dated 4thOctober 2018 any changes or revisions to the same shall be applicable to flexi-MoU scheme.
IV. Maximum attempts for clearing the exam and obtaining NTC shall be in line with CTS.
V. For practical examination and formative assessment, ITP has been given flexibility to design the questions, assess the candidates and upload their marks in the scheme portal.

VI. ITP shall develop a comprehensive Question Bank (in English and Hindi) of minimum 1000 questions, grouped by chapters and difficulty level. The same shall be vetted by NIMI experts and then be handed over to DGT for conducting theory exams. DGT may add some questions to the same before conducting actual exams.

VII. Theoretical exams shall be conducted by DGT in Computer Based Test format. Upon completion of course and payment of requisite examination fee by ITP, admit cards shall be generated by scheme portal.

VIII. DGT shall arrange for conduct of computer based theory exam at designated examination centres & certify the successful trainees with e-NTC under flexi-MoU scheme with mention of ITP name in the Certificate.

IX. Students, who have successfully appeared in the final exam after completion of course, are eligible to register as apprentices.

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time.

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

The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage for practical is 60% & minimum pass percentage of theory subjects is 33%.

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 the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

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

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

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices	• Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% accuracy achieved while undertaking different work with those demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
(c) Weightage in the range of more than 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.	• High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% accuracy achieved while undertaking different work with those demanded by the component/job. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

A crane is a tower or derrick that is equipped with cables and pulleys that are used to lift and lower material. They are commonly used in the construction industry and in the manufacturing of heavy equipment. They can either be controlled from an operator in a cab that travels along with the crane, by a push button pendant control station, or by radio type controls.

OVERHEAD CRANE

An *overhead crane*, also referred to as a *suspended crane*, this type is normally used in a factory, with some of them being able to lift very heavy loads. *Larger overhead cranes* (also known as *goliath cranes*) can be found in use in shipyards and large outdoor manufacturing plants. The hoist is set on a trolley which will move in one direction along one or two beams, which move at angles to that direction along elevated or ground level tracks, often mounted along the side of an assembly area.

Overhead Crane Operator; Bridge Crane Operator operates electrically-driven crane running on overhead rails laid on metal bridge to lift, move and lower heavy objects from one place to another. Switches on power supply; takes position in overhead cabin and signals ground crew to move away from crane; manipulates levers and controls to check and assure bridge hoist, lifting tackle etc., are free from mechanical jamming and in working order; operates controls to move bridge along rails and lifting equipment along bridge tackle for loads to be attached; follows signals from ground crew to raise, move and lower load in desired position observing proper operating and safety conditions. Shuts down power supply on completion of work. May undertake minor repairs to crane.

EOT Crane Operator; operates overhead cranes for safe transfer of raw material, intermediaries and finished products within the plant on receiving the signal.

Reference NCO:

i) 8343.0700 - Overhead Crane Operator
ii) 8343.0501 - EOT Crane Operator

4. GENERAL INFORMATION

Name of the Trade	**CRANE OPERATOR (INTEGRATED STEEL PLANT) (Flexi MoU)**
NCO – 2015	8343.0700 - Overhead Crane Operator 8343.0501 - EOT Crane Operator
NSQF Level	Level-4
Duration of Craftsmen Training	Six month
Entry Qualification	Passed 8th Class examination or its equivalent
Minimum Age	18 years as on first day of academic session.
Unit Strength (No. Of Student)	20
Space Norms	192 Sq. m.
Power Norms	17 KW
Instructors Qualification for	
1. Crane Operator (Integrated Steel Plant) trade	B.Voc/Degree in Mechanical Engineering or Automobile Engineering from recognized Engineering College /university with one year experience in the relevant field. **OR** 3 years Diploma in Mechanical Engineering or Automobile Engineering from recognized board of technical education with two years experience in the relevant field. **OR** NTC/NAC in the Trade of "CRANE OPERATOR" or related trades with 3 years post-qualification experience in the relevant field. **Essential Qualification:** NCIC (National Craft Instructor Certificate) in CRANE OPERATOR or relevant trades. ***NOTE: - Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications. However, both of them must possess NCIC in any of its variants.***

2. Workshop Calculation & Science	B.Voc/Degree in Engineering from AICTE/ UGC recognized Engineering College/ University with one year Experience in the relevant field. OR 03 years Diploma in Engineering from AICTE/ recognized Board of Technical Education or relevant Advanced Diploma (Vocational) from DGT with two years experience in the relevant field. OR NTC/ NAC in any one of the engineering trades with three years experience in the relevant field. **Essential Qualification:** National Craft Instructor Certificate (NCIC) in relevant trade. OR NCIC in RoDA or any of its variants under DGT.
3. Engineering Drawing	B.Voc/Degree in Engineering from AICTE/ UGC recognized Engineering College/ University with one year Experience in the relevant field. OR 03 years Diploma in Engineering from AICTE/ recognized Board of Technical Education or relevant Advanced Diploma (Vocational) from DGT with two years' experience in the relevant field. OR NTC/ NAC in any one of the relevant engineering group of trades categorized under Engineering Drawing / D'man (Mech. / Civil) with three years' experience. **Essential Qualification:** National Craft Instructor Certificate (NCIC) in relevant trade OR NCIC in RoDA / D'man (Mech. / Civil) or any of its variants under DGT.
4. Employability Skill	MBA/ BBA /any Graduate / Diploma in any discipline with Two years' experience with short term ToT course in Employability Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above). **OR** Existing Social Studies Instructors in ITIs with short term

	ToT course in Employability Skills from DGT institutes.				
5. Minimum Age for Instructor	21 Years				
List of Tools and Equipment	As per Annexure – I				
Distribution of training on Hourly basis: (Indicative only)					
Total Hours/ Week	**Trade Practical**	**Trade Theory**	**Workshop Cal. &Sc.**	**Engg. Drawing**	**Employability Skills**
32Hours	18Hours	6 Hours	3 Hours	3 Hours	2 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for **CRANE OPERATOR (INTEGRATED STEEL PLANT)** trade under CTS (Flexi MoU): **Level -4.**

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

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

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

a. Process
b. Professional Knowledge
c. Professional Skill
d. Core Skill
e. Responsibility

The broad learning outcome of **CRANE OPERATOR (INTEGRATED STEEL PLANT)** trade under CTS (Flexi MoU) 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	Job that requires to work in familiar predictable routine situation of clear choice	Factual Knowledge of field of working	Recall and demonstrate practical skill, routine and repetitive in narrow range of application using appropriate rule and tool, using quality concept.	Language to communicate written or oral with required clarity. Skill to basic arithmetic and algebraic principles, basic understanding of social political and natural environment.	Responsibility for own work and learning.

6. LEARNING OUTCOME

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

6.1 GENERIC LEARNING OUTCOME

1. Recognize & comply general safe working practices, environment regulation and housekeeping.
2. Explain & perform different mathematical calculation & science in the field of study including basics and apply in day to day work. *[Calculation of area, volume, Percentage, mathematical calculation, engineering materials, ferrous and non-ferrous]*
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, Lettering and numbering, Free hand sketch and drawing]*
4. Interpret & use formal and technical communication.
5. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.
6. List and interpret various acts of labour welfare legislation.
7. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
8. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
9. Utilize basic computer applications and internet to take benefit of IT developments in the industry.

6.2 SPECIFIC LEARNING OUTCOME

10. Recognize & comply safe working of cranes by having the knowledge of different control systems, safety devices and emergency control systems of the crane.
11. Explain the use of different types of cranes for different purposes. Also the functioning of different parts of the cranes for operation and maintenance.
12. Plan and organize the different parts of the crane for spare part management, maintenance management and capital repair.
13. Plan and perform the operation, inspection and maintenance of the crane, like preventive maintenance, inspection and testing before the operation.
14. Explain the operation of different parts of the crane individually for reliability of the crane operation.

15. Plan and perform the electrical maintenance of different parts of the systems required for power control, limit switches, and break assembly.
16. Prepare the system for monitoring different types of failures in the operation and crane maintenance.
17. Plan and perform the system of reporting the wear pattern/ sudden problems in the different parts of the cranes for corrective measure.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
1. Recognize & comply with general safe working practices, environment regulation and housekeeping.	Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	Recognize and report all unsafe situations according to site policy.
	Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	Identify, handle and store/ dispose of dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	Identify and observe site policies and procedures in regard to illness or accident.
	Identify safety alarms accurately.
	Report supervisor/ competent authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	Identify and observe site evacuation procedures according to site policy.
	Identify Personal Protective Equipment (PPE) and use the same as per related working environment.
	Identify basic first aid and use them under different circumstances.
	Identify different fire extinguisher and use the same as per requirement.
	Identify environmental pollution and contribute to avoidance of same.

	Take opportunities to use energy and materials in an environmentally friendly manner.
	Avoid waste and dispose waste as per procedure.
	Recognize different components of 5S and apply the same in the working environment.
2. Explain & perform different mathematical calculation & science in the field of study including basic and apply in day-to-day work.*[Different mathematical calculation & science- Calculation of area, volume, Percentage, mathematical calculation, engineering materials, ferrous and non-ferrous]*	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, center of gravity, friction.
	Measure dimensions as per drawing.
	Use scale/ tapes to measure for fitting to specification.
	Comply with given tolerance.
	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	Ensure dimensional accuracy of assembly by using different instruments/gauges.
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, Lettering and numbering, Free hand sketch and drawing*]	Read & interpret the information on drawings and apply in executing practical work.
	Read & analyse the specification to ascertain the material requirement, tools, and machining/ assembly/ maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Interpret & use formal and technical communication.	Identify and use appropriate words for communication.
	Choose proper tools to communicate.
	Use Positive body language while communicating.
	Maintain proper eye contact to built trust and confidence.
5. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	Identify factors affecting productivity.
	Awareness on quality concepts.

6. List and interpret various acts of labour welfare legislation.	Explain benefits guaranteed under various applicable Acts.
	Interpret applicable labour and industrial laws.
7 Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	Explain energy conservation, cause of global warming and pollution.
	Show protective measures to balance the resources of nature.
	Explain effects of global warming and its precautions from damage. Dispose waste following standard procedure.
8 Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	Explain personnel finance and entrepreneurship.
	Explain role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the Policies / Programmes, procedure and available schemes.
9 Utilize basic computer applications and internet to take benefit of IT developments in the industry.	Work with MS Office viz., word, excel, etc.
	Use internet for finding out various data pertaining to the trade.

SPECIFIC LEARNING OUTCOME	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
10. Recognize & comply safe working of cranes by having the knowledge of different control systems, safety devices and emergency control systems of the crane.	Knowledge of shut down procedure of cranes.
	Use of PPEs for crane operation.
	Knowledge of safety control systems for the operation of crane.
	Concept of 5S and Housekeeping.
11. Explain the use of different types of cranes for different purposes. Also the functioning of different parts of the cranes for operation and maintenance.	Explain basic function of the crane.
	Knowledge of different types of the crane and its application.
	Demonstrate role of different accessories for the crane operation.
	Knowledge of safety precautions to be taken while using earth moving cranes or hydraulic cranes.

	Knowledge of use of different cranes under different working condition.
	Knowledge of limit switches or emergency switches provided in the crane.
12. Plan and organize the different parts of the crane for spare part management, maintenance management and capital repair.	Knowledge of different parts of the crane with system of operation.
	Explain criticality of different spare parts provided in the assembly.
	Knowledge of lubricants and grease applied in the crane.
	Knowledge of inspection systems of the crane.
	Compliance with preventive maintenance Procedure for operation of the crane.
13. Plan and perform the operation, inspection and maintenance of the crane, like preventive maintenance, inspection and testing before the operation.	Prepare inspection schedule for cranes.
	Explain wear pattern of different parts of the cranes like brake drum, ropes, crane wheels.
	Knowledge of testing of different systems of the cranes like limit switches, emergency switches, bridge and trolley.
	Write and inspect log book before starting the crane.
14. Explain the operation of different parts of the crane individually for reliability of the crane operation.	Knowledge of control systems provided in different operations like bridge, trolley , rope drum assembly etc.
	Knowledge of emergency control system provided in the above operations.
	Knowledge of signals which are given from ground for the safe operation of the crane.
	Comply to safe parking area on the track to avoid collision.
	Knowledge of supply of power to different systems of the crane.
15. Plan and perform the electrical maintenance of different part of the systems required for power control, limit switches, and break assembly.	Knowledge of electrical control system of the crane.
	Knowledge of Power supply points to different systems and their control mechanism.
	Knowledge of reporting system in case of electrical brake down.
	Knowledge of organizing full /partial shutdown in case of electrical maintenance of the crane.
16. Prepare the system for monitoring different type of failure in the operation and	Knowledge of different types of failure in the operation of the crane like no supply to the system, rope out , mal functioning of limit switches etc.
	Knowledge of brake assembly and its electrical control

crane maintenance.	system.
	Demonstrate procedure for crane wheel changing , brake drum changing , rope changing etc.
	Knowledge of different tools and tackles required for changing the major components of the crane.
	Comply with the safety precaution to be taken during the changing of the above parts.
17. Plan and perform the system of reporting the wear pattern/ sudden problems in the different parts of the cranes for corrective measure.	Plan and organize the system of communication for failures of different parts of the crane.
	Perform the running maintenance of the crane based on the observation during the operation of the crane.
	Organize the statistics of monthly break downs in the crane.
	Plan and perform the corrective measures based on the statistical analysis.
	Knowledge of the sudden changing of ropes, break assembly, limit switches etc. on emergency basis.

8. SYLLABUS (BASIC SKILLS)

Durations (Hrs.)	Reference learning outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
Professional Skill 20Hrs.; Professional Knowledge 20Hrs.	Recognize & comply safe working of cranes by having the knowledge of different control systems, safety devices and emergency control systems of the crane.	• Operating of fire extinguisher • Skill to applying emergency break • Skill to stop crane in emergency use of PPEs	Safety devices installed with crane • Buffer & Stoppers • Bell/Siren-audiable min 30 mtr distance • Hand railing- HT min 30", max 37" • Limit switch-rotary, counter wt, striker types • Protection guard • Toe guard- min 100 mm high • Hook latch • Wind / emergency brake • Fire Extinguisher • Heat protection shield • Light, sensor, audio & visual units • Red flag/ safety banner • Cautioning board • Emergency stop switch
Professional Skill 25Hrs.; Professional Knowledge 10Hrs.	Explain the use of different types of cranes for different purposes. Also the functioning of different parts of the cranes for operation and maintenance.	• Identification of defined crane used in integrated steel plant.	A) Function and classification of EOT crane • Design basis • Installation basis • Attachment with hoist drive • Duty wise classification B) Structural components of EOT crane C) Mechanical component of EOT crane
Professional Skill 20Hrs.; Professional Knowledge 10Hrs.	Plan and organize the different parts of the crane for spare part management, maintenance management and capital repair.	• To identify the different parts of crane.	Different parts of Crane • Gantry girder • Crane girder • Balancer bogie • Anti collision device • Rope drum • Wheel load

Professional Skill 20Hrs.; Professional Knowledge 10Hrs.	Plan and perform the operation, inspection and maintenance of the crane, like preventive maintenance, inspection and testing before the operation.	• Testing of Cranes - H M cranes six monthly, rest yearly once. • Deflection measurement skill	Load testing with 25% SWL, Recorded girder deflection at centre, Fitness certificate.
Professional Skill 15Hrs.; Professional Knowledge 10Hrs.	Explain the operation of different parts of the crane individually for reliability of the crane operation.	• Knowledge of different signals for operation of crane • Operation of different drives like LT, Bridge trolley, Hoist travel, auxiliary Hoist.	Drives of EOT crane • Long travel • Cross travel • Hoist travel • Aux. Hoist 1&2
Professional Skill 20Hrs.; Professional Knowledge 20Hrs.	Plan and perform the electrical maintenance of different parts of the systems required for power control, limit switches, and break assembly.	• Brake down and maintenance of the crane. • Brake adjustment skill	Brake assembly • Armature assembly • Base frame • Arm • Tie road assembly • Armature coil • Side adjustment bolts • Brake shoe
Professional Skill 15Hrs.; Professional Knowledge 10Hrs.	Prepare the system for monitoring different types of failures in the operation and crane maintenance.	• Identification of different types of failure and skill of how to report.	• Different types of breakdown Mechanical , Structural, Electrical, Rope out, Snapping of rope, Jamming of drive, Derailment of wheel.
Professional Skill 15Hrs.; Professional Knowledge 10Hrs.	Plan and perform the system of reporting the wear pattern/ sudden problems in the different parts of the cranes for corrective measure.	• Inspection report, History register, log book writing, S.O.P.	Wire rope , slings • Wire • Crane • Strand • Measurement of wire rope diameter • Wire rope lay • Wire rope specification • Different type of sling • Types of failures in rope slings • Safe use of rope sling

9. SYLLABUS -CORE SKILLS

9.1 ENGINEERING DRAWING AND WORKSHOP CALCULATION & SCIENCE

Engineering Drawing	Duration in Hrs.	Workshop Science & Calculation	Duration in Hrs.
Engineering Drawing: Introduction and its importance - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003 - Drawing Instruments : their Standard and uses - Drawing board, Mini Drafter or T-Square , Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, etc.), Pencils of different Grades, Drawing pins / Clips.	4	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units.	6
Lines : - Classification of lines (Hidden, centre, Dimension, Section) - Drawing lines of given length - (Straight, curved) - Drawing of parallel lines, - perpendicular line - Methods of Division of line - segment	4	Fractions & Simplification: Fractions, Decimal fraction, Addition, Subtraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems Simplification using BODMAS.	6
Drawing of Geometrical Figures: Definition, nomenclature and practice of - - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, - Circle and its elements.	8	Area and perimeter of square, rectangle and triangle. Area and Perimeter of Circle, Semi-circle , circular ring Volume of solids- cube, cuboids, cylinder	10
Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke.	6	Profit and loss, calculation of selling price, cost price, profit and loss.	6
Free Hand sketch: Hand tools and measuring instruments used in the Trade. **Free hand drawing :**	8	Calculation of simple interest, simple interest, compound interest.	6

- polygons, ellipse, etc. - Geometrical figures and blocks with dimension.			
Symbolic representation – different symbols used in the trade. -Transferring measurement from the given object to the free hand sketches. - Reading of trade related drawing	10	Material Science : Properties - Physical & Mechanical, Types – Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	6
TOTAL	**40**	**TOTAL**	**40**

9.2 CORE SKILL- EMPLOYABILITY SKILLS

Syllabus for Employability Skills (80 Hrs.)	
Module	**Topics**
1. Behavioural Skills	**Duration: 6 Hrs. Marks: Nil**
Expectation Setting	Creating a focused and responsible learning environment
Personal Strength Analysis/Strength Blindness	Self -awareness and confidence building
Perception Management	Display Professionalism at the institute and work place
Ethics, Values& Etiquette	Increased social initiations relationships and networks Acceptance of peers from different cultures and social groups and work with them. Collaboration with team to prioritize the common goal and compromise individual priorities.
Social Etiquette	Characteristic of a responsible citizen- Display the same by respecting self, others, environment, care for duty and value for time.
2. English Literacy	**Duration: 20 Hrs. Marks: 10**
Functional English	Importance of Learning English Different Naming words, Words used for replacing names, Action words, Describing people, place and their use. Introduction to punctuation - Comma, Full stop, Question mark. Singular plural Change of tense - Simple present, past; present, past progressive Construction of simple sentences - Kinds of sentences Usage of appropriate words to express themselves Greetings & Self Introduction Asking &responding to questions Sharing information with others Speak and provide information about workplace
Reading	Reading simple sentences about: a) Self b) Work c) Environment
Written English	Simple writing skills
3. Communication Skills	**Duration: 10 Hrs. Marks: 8**
Self- Introduction	Interview Skills/Confidence Building
a. Verbal Communication	Understand the usage of appropriate words to express themselves Communicate effectively on telephone.
b. Non-Verbal	Manage Personal Hygiene and Presentation

Communication	Positive body language: adopt and use it appropriately to build a positive impression
	Maintaining appropriate eye-contact in building trust and confidence
	Impact of touch in a formal environment. Acceptable and unacceptable touch.
	Role of tone in any communication.
Campus to Work	Time Management and Planning Skills
	Interview skills- its phases & ways to crack interview.
4. I.T. Literacy	**Duration: 10 Hrs. Marks:10**
Basics of Computers	Introduction to Computers and its applications Hardware and peripherals Starting and shutting down of computer Basic of computer Networks.
Operating System	Basics of Operating System Types of Operating Systems User interface of Windows 10 OS/ latest Create, Copy, Move and delete Files and Folders Use of External memory like pen drive, etc,
MS-Word	Basic operating of Word Processing Creating, opening and closing Documents Use of shortcuts, Creating and Editing of Text, Formatting the Text Creating simple document like - resume, letter writing, job application etc., Printing document
Web browsers & Search Engines	Introduction to world wide web (WWW), Useful websites, web browser - usage, search engine etc. Using popular sites like Bharat Skills, Skill Training related Government portals, naukri.com and other job portals, CITS applications, Apprenticeship portal (NAPS), resize images, signing up, Online fund transfer using UPI gateway.
Email	Creating & using an email account –like Gmail or any other. Usage of CC & BCC. Attaching documents Checking email and composing Email.
Mobile application	Scanning QR/AR code, Sharing best practices and downloading trade related videos using Wi-Fi, Fund transfer through App like BHIM.
5. Entrepreneurship Skills	**Duration: 10 Hrs. Marks: 06**
Entrepreneur	Need of becoming entrepreneur
	Ways to become a good entrepreneur
	Enabling environment available to become an entrepreneur. Different Govt. institutions/schemes promoting Entrepreneur viz., Gramin banks, PMMY-MUDRA loans, DIC, SIDA, SISI, NSIC, SIDO. Different Government schemes supporting entrepreneurship.

6. Maintaining Efficiency at Workplace Duration: 6 Hrs. Marks: 04	
Maintaining Efficiency at Workplace	Factors affecting productivity
	Improving Productivity
	Personal finance literacy Planning, Saving, Tax, Govt. schemes for financial safety e.g. Pradhan Mantri Jeevan Jyoti Bima Yojana (**PMJJBY**), etc.
7. Occupational Safety, Health and Environment Education Duration: 6 Hrs. Marks: 04	
Safety and Health	Introduction to Occupational Safety & health at work place, Occupational Hygiene
Occupational Hazards	Basic Hazards. Chemical, Physical (Electrical, Temperature, Illumination) Ergonomic, Biological, Vibro acoustic, Mechanical, Psychosocial Hazards, Prevention of hazards
Accident and Safety	Different types of Personal Protective Equipment (PPE) Accident Prevention techniques
First-aid	Care of injured & Sick at the workplace First-Aid & Transportation of sick person
Basic provisions on safety and Health	Basic provisions of safety & health
Environmental Issues	Introduction to Environment, ecosystem and factors causing imbalance Pollution and pollutants including liquid, gaseous, solid and hazardous waste Protecting the environment - Energy Conservation, global warming Segregation and disposal of waste
8. Labour Welfare Legislation Duration: 04 Hrs. Marks: 02	
Labour Welfare Legislation	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, POSH. Interpret applicable labour and industrial laws.
9. Quality Management Duration: 02Hrs. Marks: 02	
Quality Concept and Consciousness	Create awareness on introduction of quality Concepts.
10. Preparation to the world of work Duration: 6 Hrs. Marks: 04	
Career Plan	Identify the difference between job and career
Basic Professional Skills	Job roles available in respective trades
Career Pathways	Awareness of industries, and the respective professional pathways
Search and apply for a job	Awareness of higher education / up skilling (short-term) options Steps involved in online application for Instructor course, Apprenticeship and different jobs in popular site like theindiajobs.com, naukri.com, monsterindia.com, Govt. website.

DETAILS OF COMPETENCIES (ON-JOB TRAINING)

Learning to be covered in Industry for CRANE OPERATOR INTEGRATED STEEL PLANT trade under CTS (Flexi-MoU).

1. Safety and best practices/ Basic culture (5s/Kaizen)
2. Log book writing and maintaining records.
3. Storing of different tools and consumables.

ON THE JOB TRAINING:-

On the job training will be given by Master Operator for operation/ shut down/ maintenance of EOT Cranes of different capacities like 30 T/ 50 T/ 100 T/ 300 T in the following department.

1. Steel melting shop	Duration: 100 hrs.
2. Thin slab caster	Duration: 100 hrs.
3. Hot strip mill	Duration : 100 hrs.
4. Blast Furnace	Duration : 40 hrs.
5. Sintering plant	Duration : 40 hrs

The Master Operator will be sitting in the cabin along with the trainee till the trainee is confident of running the crane independently. Master operator will provide all necessary guidance, safety precautions, signaling during crane operation, writing log book, writing crane inspection book, operation of bridge, operation of trolley, operation of hoist etc.

ANNEXURE-I

List of Tools & Equipment			
CRANE OPERATOR (INTEGRATED STEEL PLANT) (For batch of 20 candidates)			
S.no	**Name of the Tool & Equipments**	**Specification**	**Qty**
A. TRAINEES TOOL KIT			
1	Steel Rule with metric & British graduation		20
2	Try Square.		20
3	Caliper inside spring type.		20
4	Caliper hermaphrodite spring type		20
5	Caliper outside spring type		20
6	Divider spring type		20
7	Scriber		20
8	Centre Punch		20
9	Screw driver		20
10	Chisel cold flat		20
11	Hammer ball peen With handle		20
12	Hammer ball peen With handle.		20
13	File flat - second cut		20
14	File flat smooth		20
15	File half round second cut		20
16	Hacksaw frame fixed type		20
17	Safety goggles.		20
18	Dot punch		20
B. INSTRUMENTS AND GENERAL SHOP OUTFIT			
19	Steel Rule Graduated both in Metric and English Unit		4
20	Straight edge steel		2
21	Spirit Level metal	Type - 2	1
22	Stud Extractor EZY - out		2
23	Combination Set		2
24	Micrometer outside.	0 – 25 mm	2
25	Micrometer outside.	25 – 50 mm	2
26	Micrometer outside.	50 – 75 mm	2
27	Micrometer inside with extension rods.		1
28	Vernier caliper	150mm	4
29	Vernier height gauges	300 mm	1
30	Vernier bevel protractor Blade with Acute Angle Attachment		1

31	Screw pitch gauge Metric		1
32	Measuring Steel Tape	5 Mtr	5
33	Combination plier insulated	200mm	5
34	Screw Driver Insulated Diamond Head	4 X 150mm	5
35	Screw driver insulated	6 X150mm	5
36	Electrcian screw driver insulated handle thin stem	4 X 100MM	5
37	Heavy duty screw driver insulated	5 X 200mm	5
38	Electrician Screw Driver thin stem insulated handle	4 X 250MM	5
39	Punch Centre	9 X 150MM	5
40	Knife Double Bladed Electrician	100MM	5
41	Neon Tester	500V	5
42	Steel Rule Graduated both in Metric and English Unit	300mm with precision of 1/4th mm	5
43	Hammer, cross peen with handle	250Gm	5
SHOP TOOL, INSTRUMENTS & MACHINERY			
44	Crimping Tool	1.5 sq mm to 16 sq mm	5
45	Crimping Tool	16 sq mm to 95 sq mm	5
46	Wire Cutter and Stripper	150mm	5
47	Contactor 3-ϕ, auxlliary contacts	25A ,415V,2NO & NC	5
48	Contactor 3-ϕ,auxlliary contacts	32A, 415V, .2NO & NC	5
49	Limit switch lever operated	2A, 500V, 2 contacts	5
50	Rotary switch	16A, 440V	5
51	Pin type, shackle type, Egg type & suspension type insulators including Hardware fitting		5

TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
S 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	20 nos.
2.	UPS	As required
3.	Scanner cum Printer	1 no.
4.	Computer Tables	20 nos.
5.	Computer Chairs	20 nos.
6.	LCD Projector	One in each class room
7.	White Board 1200mm x 900mm	One in each class room

NISP Training Center ANNEXURE-II

Trainee Internal Assessment Report

Name :		**Batch No:**	
Card ID No :		**Dept:**	
Attendance % :			

Quarters	Month	Attend %	Month	Attend %	Month	Attend %	Quarterly Average Attend. %
Qtr-1							
Qtr-2							
Qtr-3							
Qtr-4							

General Assessment **Assessment Period :**

S.No	ATTRIBUTES		Score Qtr-1	Score Qtr-2	Score Qtr-3	Score Qtr-4	Score Sum of 4-Qtrs
1	**Safety**	Knowledge, follow safety precautions and rules					
2	**Sense of Responsibility**	Does he obey Sup/Line i/c instructions					
		Does he attend shift start meetings regularly					
		Does he take supervisors feedback properly					
		Whether he takes planned leaves					
		Does he participates in new drives					
		Does he take care in handling tools					
		Is Punctual					
		Positive, Behaviour, response, learning					
		Maintain 5S at his work station					
		Co-operation - Consider team work, willingness to work with and for others					
		Able to identify and report irregularities at his work place					
3	**Method**	Follow WIS/MOS					
		Able to check faults of previous station					
		Understands tools/equipment functions and its different parts					
		Able to perform the job independently					
4	**Speed**	Able to match line "TACT" time					
		Willingness to learn/flexibility for alternate job					
		Work completion/target achievement					
5	**Quality**	Able to contain defects					
		Awareness about GCA/PDI					
		Skill acquired during "On job training"					
		Total Score					
		Max. Marks					

Fill score in relevant box	**Exellent:4**	**Very Good:3**	**Good:2**	**Fair:1**
			Need Improvement:0	
Remark of Supervisor: Mention Achievement				
Remark of Shift In charge/Dept, Mgr.				
Remark of NISP Training In charge				
Any Remark				

12. COMMITTEE OF TRADE EXPERT

S.N.	Name(S/Shri.)	Qualification	Experience	Status
1.	Dr. S.N.Singh Ex. ED, SAIL Bokaro Steel Plant	BE , Phd.	40 years experience of steel industry	Chairman
2.	S.K.Saha Ex. ED, MEL(SAIL)	BE (Mech.)	25 years experience of mechanical maintenance of steel industry	Member
3.	K.K.Tripathi Sr.Mgr. , NISP, NMDC	BE(Mech.) , MBA	15 years experience of mechanical maintenance	Member
4.	P. Sahoo Ex. ED, Roukela Steel Plant	M. Tech. (Elect.)	35 years experience of electrical maintenance of steel industry	Member
5.	P. Agarkar DGM(Mech.) NISP. Nagarnar	BE (Mech.)	20 years experience of mechanical maintenance of steel industry	Member