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

COMPETENCY BASED CURRICULUM

ELECTRICIAN (INTEGRATED STEEL PLANT)

(Duration: One-Year)

CRAFTMAN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL- 4

SECTOR – CAPITAL GOODS & MANUFACTURING

Directorate General of Training

Skill India
कौशल भारत - कुशल भारत

ELECTRICIAN

(INTEGRATED STEEL PLANT)

(Engineering Trade)

(Designed in 2019)

Version: 1.0

CRAFTSMEN TRAINING SCHEME (CTS)

(Flexi MoU)

NSQF LEVEL - 4

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Developed By
N.M.D.C.IRON &STEEL PLANT, NAGARNAR
JAGADALPUR (C.G.)
&

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

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 ELECTRICIAN (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 one-year duration, a candidate is trained on subjects Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Science & Calculation 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 skills in Electrical maintenance process of INTEGRATED STEEL PLANT in today's steel industry. The **one year** course coverage is categorized as below:

The contents covered are safety aspects related to trade, familiarization with Integrated Steel Plant working covering electrical maintenance process such as familiarization of different type of cables, wires, conductors, measurement of unknown resistance, measurement of current and voltage in electrical circuit to verify different flows, familiarized with different type of batteries, identify system earthing and safety earthing in electrical installation. Identify various conduit and different electrical accessories, prepare test board/ extension board and mount accessories like lamp holders, switch, socket, relays, MCB, RCCB, MCCB etc. Identification of type of transformers, testing of single phase and three phase transformers. Testing of transformer oil, current transformer, voltage transformer and their use and specification. Identify and familiarize with different types of analog and digital measuring equipment both single phase and three phases. Multimeter, power meter, energy meter, phase sequence, ammeter voltmeter and phase sequence meter. Measure power and energy in single phase and three phase circuit. Tong tester and its use in electrical circuit. Identification of different parts and terminals of AC motor, connection, starting, running of AC motor with DOL and star delta starter. Determine efficiency of three phase induction motor. Slip ring induction motor and starting method. Connection of single phase motor, identification testing and running of the same.

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 a 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 – ELECTRICIAN 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 one year:

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	290
2	Professional Knowledge (Trade Theory)	155
3	Workshop Calculation & Science	80
4	Engineering Drawing	80
5	Employability Skills	160
	Total	**765 hrs**

B- On The Job Training ; (900 hrs)

Revision and Examination (100 hrs)

Total duration hrs. -765 + 900 + 100= 1765 hrs.

Total training hours:-

Duration	Basic Training	On-Job Training	Revision and Examination	Total
For 1 year course	765 hrs.	900 hrs. Including one day in a week training at Training Institute.	100hrs.	1765 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 4th October 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 passed 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 yearly 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.

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3. JOB ROLE

1. Electrician-Power system and its distribution

i. Power flow from MRS to any system HT (33kv)
ii. Down below stepping down and further flow from 6.6 kv to 415 v and 690v
iii. Knowledge of various transformers.
iv. Working of transformer.
v. Maintenance of transformer.
vi. Various switchgear and its functional aspects and maintenance like HT switch gear, LT switchgear.

2. Electrician-Control System

i. Reading electrical drawing
ii. Various control system
iii. Automation and control
iv. PLC control its Logistic

3. Electrician-VVVF (Variable Voltage, Variable frequency)

i. Knowledge of VVVF and its applicability
ii. Setting the frequency to achieve the desired request
iii. Monitoring through feedback system
iv. Identifying the signal faults
v. Replacement in the event of failure

4. Electrician-Instrumentation and its operation

Like – Ammeter, Voltmeter, Frequency meter, wheat stone bridge, Multimeter, Megger , Earth testing, etc.

i. Circuit diagram of the system
ii. Working of various instrument like Multimeter, Megger, Wheatstone bridge, Earth testing.
iii. System correction through instrumentation technology.

5. Electrician-Motors

i. Knowledge of various motor
ii. Type of motor
iii. Bearing changing
iv. Trial and testing of motor

v. Healthiness of motor

6. Electrician- Transformer

Open and maintenance of different type of transformer

i. Outdoor application
ii. In door application
iii. Electrical protection system

7. Electrician-Earthing

i. Various types of earthing
ii. Step voltage , touch voltage
iii. Norms of earthing as per Indian standard

8. Electrician- Shift working

i. Taking shut down of equipment for electrical maintenance and follow safety procedure
ii. Trouble shooting
iii. Limit switch setting
iv. Control system of different equipment
v. Working of different switches
vi. Knowledge of fuse system in different equipment

Electrician General; installs, maintains and repairs electrical machinery equipment and fittings in factories, workshops power house, business and residential premises etc. Studies drawings and other specifications to determine electrical circuit, installation details etc. Positions and installs electrical motors, transformers, switchgears. Switchboardsand other electrical equipment, fittings and lighting fixtures. Makes connections and solders terminals. Tests electrical installations and equipment and locates faults using megger, test lamps etc. Repairs or replaces defective wiring, burnt out fuses and defective parts and keeps fittings and fixtures in working order. May do armature winding, draw wires and cables and do simple cable jointing. May operate, attend and maintain electrical motors, pumps etc.

Electrical Fitter; fits and assembles electrical machinery and equipment such as motors, transformers, generators, switchgears, fans etc., Studies drawings and wiring diagrams of fittings, wiring and assemblies to be made. Collects prefabricated electrical and mechanical components according to drawing and wiring diagrams and checks them with gauges, megger etc. to ensure proper function and accuracy. Fits mechanical components, resistance, insulators, etc., as per specifications, doing supplementary tooling where necessary. Follows wiring diagrams, makes electrical connections and solders points as specified. Checks for continuity, resistance, circuit shorting, leakage, earthing, etc. at each stage of assembly using megger, ammeter, voltmeter and other appliances and ensures stipulated performance of both mechanical and electrical

components filled in assembly. Erects various equipment such as bus bars, panel boards, electrical posts, fuse boxes switch gears, meters, relays etc. using non-conductors, insulation hoisting equipment as necessary for receipt and distribution of electrical current to feeder lines. Installs motors, generators, transformer etc. as per drawings using lifting and hoisting equipment as necessary, does prescribed electrical wiring, and connects to supply line. Locates faults in case of breakdown and replaces blown out fuse, burnt coils, switches, conductors etc. as required. Checks, dismantles, repairs and overhauls electrical units periodically or as required according to scheduled procedure. May test coils. May specialize in repairs of particular equipment manufacturing, installation or power house work and be designated accordingly.

Reference NCO-2015:

(i) 7411.0100 - Electrician General
(ii) 7412.0200 - Electrical Fitter

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4. GENERAL INFORMATION

Name of the Trade	**ELECTRICIAN- INTEGRATED STEEL PLANT (Flexi MoU)**
NCO – 2015	7411.0100 - Electrician General 7412.0200 - Electrical Fitter
Qualification Code	DGT/7008
NSQF Level	Level-4
Duration of Craftsmen Training	One year
Entry Qualification	Passed 10th Class examination with science and Mathematics 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. THEORY & PRACTICAL	B.Voc/Degree in Electrical Engineering from recognized Engineering College /university with one year experience in the relevant field. **OR** 3 years Diploma in Electrical Engineering from recognized board of technical education with two years experience in the relevant field. **OR** NTC/NAC in the Trade of "ELECTRICIAN" with 3 years post-qualification experience in the relevant field. **Essential Qualification:** NCIC (National Craft Instructor Certificate) in ELECTRICIAN trade. ***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 year' 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.
List of Tools and Equipment	As per Annexure – I

Distribution of training on Hourly basis: (Indicative only)	

Total Hours/ Week	Trade Practical	Trade Theory	Work shop Cal. & Sc.	Engg. Drawing	Employability Skills
32 Hours	12Hours	8Hours	6 Hours	4 Hours	2 Hours

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5. NSQF LEVEL COMPLIANCE

NSQF level for **Electrician (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 **Electrician (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, Ratio & proportions, Heat & Temperature, Basic Electricity, 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, scales, Lettering and numbering, Free hand sketch and drawing]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Interpret & use formal and technical communication.
6. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.
7. List and interpret various acts of labour welfare legislation.
8. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
9. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
10. Utilize basic computer applications and internet to take benefit of IT developments in the industry.

6.2 SPECIFIC LEARNING OUTCOME

11. Recognize & comply with Health, Safety & Environment practices in a Steel manufacturing plant.
12. Carry out joining of different types of cables, testing of cable resistance and insulation resistance by using different instrument.
13. Measure resistance in different circuit for voltage, current, power and power factor in single phase and poly phase and D.C circuit.
14. Plan and execute charging, discharging and testing of different batteries and power banks.
15. Plan and prepare earthing in different electrical installation and measurement of earth resistance by using different methods.

16. Mount different accessories like lamp holders, switches, sockets, fuses, relays, MCB, MCCB, RCCB preparing test board/ extension board and carry out fault detection and correction of domestic and industrial wiring installation.
17. Check the six characteristic of Diode, functioning of different types of transformers, operation, maintenance and trouble shooting of invertors, voltage, stabilizers, UPS etc.
18. Check the usages of transformer with different component, accessories, vector group and transformation ratio, calculate transformer loss and test single phase & three phase transformer/current transformer/voltage transformer.
19. Monitor working of different types of analogue and digital measuring equipment both single phase and three phase like multimeter, power meter, energy meter, phase sequence ammeter and voltmeter.
20. Check and troubleshoot different parts of A.C. motor, different types of starter and it's connection for three phase motor.

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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	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.

day-to-day work.*[Different mathematical calculation & science- Calculation of area, volume, Percentage, Ratio & proportions, Heat & Temperature, Basic Electricity, mathematical calculation, engineering materials, ferrous and non-ferrous]*	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. *Select and ascertain measuring instrument and measure dimension of component and record data.*	*Select appropriate measuring instruments such as micrometers, vernier callipers, dial gauge, bevel protector and height gauge, feeler gauge (as per tool list).*
	Ascertain the functionality & correctness of the instrument.
	Measure dimension of the components & record data to analyse with the given drawing/measurement.
5. 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.
6. Apply the concept in productivity & quality management in day to day work to improve productivity & quality.	Identify the trades and critical ingredients.
	Identify factors affecting productivity.
	Awareness on quality concepts.
	Maintain quality management systems (QMS) via using PDCA, Fishbone, 5S, 5D,Kaizen.
7. List and interpret various acts	Explain benefits guaranteed under various applicable Acts.

of labour welfare legislation.	Interpret applicable labour and industrial laws.
8. 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.
9. 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.
	Prepare Project report to become an entrepreneur for submission to financial institutions.
10. 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.

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SPECIFIC LEARNING OUTCOME (BASIC SKILL)	
LEARNING OUTCOME	**ASSESSMENT CRITERIA**
11. Recognise & comply with Health, Safety & Environment practices in a steel manufacturing plant.	Identify different tools required electrical installation.
	Adopt various fire fighting measures used in electrical installation.
	Comply with safety working measures pertaining to the trade and perform elementary First Aid during emergency situations.
	Identify environmental pollution and contribute to avoidance of same.
12. Carry out joining of different types of cables, testing of cable resistance and insulation resistance by using different instrument.	Identify various types of cable.
	Identify power cables and control cables.
	Identify various insulating material.
	Identify multi core cable, it's purpose and usages.
	Knowledge of insulation resistance and it's measurement.
	Identify the instrument required for measuring the cable resistance.
13. Measure resistance in different circuit for voltage, current, power and power factor in single phase and poly phase and D.C circuit.	Check measurement of resistance value in series, parallel combination.
	Measure DC & AC current by direct and indirect method.
	Identify power factor and it's significance.
	Apply method to improve power factor.
	Comply with safety precaution to be taken during current measurement.
14. Plan and execute charging, discharging and testing of different batteries and power banks.	Perform charging in different modes.
	Identify different types of batteries.
	Knowledge of electrolyte being used.
	Identify batteries.
	Carry out maintenance of batteries.
15. Plan and prepare earthing in different in electrical installation and measurement of earth resistance by using different methods.	Explain Types of earthing.
	Carry out the methods of earthing.
	Explain importance of step and touch voltage.
	Check earth resistance and limits prescribed by it.
	Measure earth resistance by earth tester.
16. Mount different accessories like lamp	Explain different types of lamp holders.
	Connect tube light, ordinary lamps with requisite safety

holders, switches, sockets, fuses, relays, MCB, MCCB, RCCB preparing test board/ extension board and carry out fault detection and correction of domestic and industrial wiring installation.	precautions.
	Troubleshoot voltage stabilizer, inverter and UPS.
	Identify sockets, 2pin, 3 pin, with ampere rating, voltage.
	Knowledge of relays, MCB, MCCB, RCCB.
	Knowledge of preparing test board and extension board.
	Check fault and take corrective measure to liquidate it.
17. Check the six characteristic of Diode, functioning of different types of transformers, operation, maintenance and trouble shooting of invertors, voltage, stabilizers, UPS etc.	Prepare full wave, half wave rectifiers by using single diode, four diode and six diode.
	Knowledge of transformer and its application in electrical circuit.
	Identify current and voltage transformer.
	Check the polarity of diode.
	Identify different types of fuses and check it's applicability.
	Trouble shoot voltage stabilizer, inverter and UPS.
	Check functioning of UPS and it's maintenance.
18. Check the usages of transformer with different component, accessories, vector group and transformation ratio, calculate transformer loss and test single phase & three phase transformer/ current transformer/ voltage transformer.	Identify various components of transformer, various losses in transformer; core loss, copper loss in transformer and its calculation.
	Calculate vector group measure transformation ratio in a power transformer, current transformer and potential transformer.
	Changing tap to increase /decrease voltage level.
	Check parallel operation of transformer and it's prerequisite condition.
19. Monitor working of different types of analogue and digital measuring equipment both single phase and three phase like multimeter, power meter, energy meter, phase sequence ammeter and voltmeter.	Check working and operation of different measuring instrument like - Multimeter digital/ analog Power meter Energy meter Voltmeter (1phase, 3 phase) Digital/Analog Ammeter with poly phase connection Ohm meter

20. Check and troubleshoot different parts of A.C. motor, different types of starter and its connection for three phase motor.	Check constructional detail and functioning of motors like- Single phase AC motor, 3 phase AC squirrel /cage motor, 3 phase AC slip ring motor.
	Check and troubleshoot various parts of motor.
	Check and troubleshoot various losses in motor like copper losses, core losses, Friction losses etc.
	Identify different types of starter.
	Check and troubleshoot D.O.L. Starter, Reversible Starter with minimum interlocks.
	Check for functionality of various motors and starters after repair.

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8. SYLLABUS(BASIC SKILL)

Duration (Hrs.)	Reference Learning Outcome	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
Professional Skill 11 Hrs.; Professional Knowledge 8 Hrs.	Recognize & comply with Health, Safety & Environment practices in a Steel manufacturing plant.	Apply safe working practices in different electrical installation. Identification of safety symbols, signs being practiced in electrical installation. Preventive measures being implemented for electrical accident and measures to be taken for management in post accident such as first aid, artificial respiration etc. Housekeeping measures adopted in electrical installation including disposal of waste materials in order to maintain cleanliness. Use of different PPES and tools used while working in electrical installation Fire fighting measures adopted in electrical installation like fire extinguishers.	Safety rules, regulations with regards to electrical trade. Prevention of accidents in electrical trade different signs, symbols in electrical accessories along with safety sign. First aid safety Practices with special reference to electrical accident. Personnel safety appliances for electrician and different safety tools and equipments. Response to emergencies such as power failure, electrical fire etc.
Professional Skill 31 Hrs.; Professional Knowledge 18 Hrs.	Carry out joining of different types of cables, testing of cable resistance and insulation resistance by using different instrument.	Familiarize with different type of cables, wires, conductors. Practice on bare conductors joints, such as rat tail, Britannia, straight, tee, western union joints. Carry out skinning, twisting and crimping. Practice in soldering and brazing. Practice on using	Fundamental of electricity, definition units. Fundamental terms-Current, Voltage frequency AC, DC, phase neutral etc. Introduction to National electricity code explanation, definition and

		standard wire gauge and micrometer to measure size of conductor. Testing of cable insulation resistance using insulation resistance tester/megger. Make straight through & end termination joints of different type of cables.	properties of conductor insulator and semiconductor. Types of cables, wire and their specification along with voltage grade Low, medium and high voltage joints in electrical conductor technique of soldering and brazing.
Professional Skill 31 Hrs.; Professional Knowledge 18 Hrs.	Measure resistance in different circuit for voltage, current, power and power factor in single phase and poly phase and D.C circuit.	Measure unknown resistance stands alone, series and parallel circuit to verify Ohm's Law. Measurement of current and voltage in electrical circuit to verify Kirchhoff's law. Measure resistance using voltage drop method. Verify characteristic of series and parallel combination. Experiment on poly phase circuit's current, voltage, power and power factor measurement in single phase and poly phase circuits. Measurement of energy in single and poly phase circuit use of phase sequence meter.	Study of simple electrical circuit and problems. Ohm's Law, Kirchhoff's Law, Series and parallel circuits. Compare altering current and DC circuit with terms frequency, instant need values. Average and RMS. Inductive and capacitive reactant. Power factor, single phase, three phase, three wire and four wire system and its characteristic. Active and reactive of power, PF, Energy in all systems concept of three phase star and Delta connection. Line and phase voltage in a 3 phase circuit.
Professional Skill 31 Hrs.; Professional Knowledge	Plan and execute charging, discharging and testing of different batteries and power banks.	Familiarize with different type of batteries. Practice on battery charging and connection of battery bank testing of battery.	Principle of electrolysis and chemical effect of electric current. Types of cells. Lead Acid cell, Principle of Operation. Types of battery, charging,

13 Hrs.			safety precaution, test equipment, Installation of battery bank for specified voltage and current.
Professional Skill 31 Hrs.; Professional Knowledge 18 Hrs.	Plan and prepare earthing in different electrical installation and measurement of earth resistance by using different methods.	Identify system earthing and safety earthing in electrical installation. Different methods of earthing measurement of earth resistance by earth tester ELCB, RCBB and earth leakage device and its principle and their testing.	Importance of earthing in electrical system. Different types of earthing methods and its regulation. Earth resistance and earth leakage circuit breaker.
Professional Skill 31 Hrs.; Professional Knowledge 13 Hrs.	Mount different accessories like lamp holders, switches, sockets, fuses, relays, MCB, MCCB, RCCB preparing test board/ extension board and carry out fault detection and correction of domestic and industrial wiring installation.	Identify various conduit and different electrical accessories prepare text boards/extension board and mount accessories like lamp holders, switches, socket, fuses, relays, MCB, RCCB, MCCB etc. Practice the different wiring system testing of wiring installation. Application of fuses, MCB, RCCB and MCCB. Draw layout and practice in PVC casing- capping, conduit wiring. Practice fault detection of domestic and industrial wiring installation and repair.	CEA regulation on electrical wiring type of domestic and industrial wiring study of wiring accessories such as switches, fuses, relay, MCB, MCCB, RCCB. Voltage drop concept PVC, concealed system. Specification of conduct system. Different types of wiring such as power, control, communication and entertainment testing of wiring system.
Professional Skill 31 Hrs.; Professional Knowledge	Check the six characteristic of Diode, functioning of different types of transformers, operation, maintenance and trouble shooting of invertors, voltage,	Determine the value of resistance by color code and determine their type. Determine VI characteristic of Diode construct and test half wave, full wave rectifier circuit, and Bridge rectifier circuit.	Resistance –color code and characteristic semiconductor device, P-N Junction classification of diodes, reverse and forward bios, specification, heat

13 Hrs.	stabilizers, UPS etc.	Check transistor for their functioning and identify their types. Operation, maintenance and trouble shooting of Inverters, voltage stabilizer DC regulated Power supply, UPS etc.	sink. Convertor circuits both DC and AC. Active and passive element. Types of transistor and application including specification.
Professional Skill 31 Hrs.; Professional Knowledge 18 Hrs.	Check the usages of transformer with different component, accessories, vector group and transformation ratio, calculate transformer loss and test single phase & three phase transformer/ current transformer/ voltage transformer.	Identification of types of Transformers. Verify terminal, indentify components, transformation ratio, and calculate losses and efficiency of single phase and three phase transformer vector group. Testing of single phase and three phase transformer. Transformer oil and its use. Testing of transformer oil. Current transformer, voltage transformer and their use and specification.	Working principle, construction and classification of transformer single phase and three phase transformer. Turns ratio, series and parallel operation voltage regulation and efficiency. Auto transformer and instrument transformer. Cooling of transformer and different auxiliary equipment. Such as breather, conservator, buchholz relay and tap changer. Dry type transformer. Oil and minding temp. meter transformer oil circuit characteristic and testing.
Professional Skill 31 Hrs.; Professional Knowledge 18 Hrs.	Monitor working of different types of analogue and digital measuring equipment both single phase and three phase like multimeter, power meter, energy meter, phase sequence ammeter and voltmeter.	Identify and familiarize with different types of analog and digital measuring equipment both single phase and three phases. Multimeter, power meter, energy meter, phase sequence, ammeter voltmeter ad phase sequence meter. Measure power and	Types of indicating meter both analog and digital their principle of working and use. Ammeter, voltmeter, multimeter, power meter, energy meter, PF, frequency, Insulation tester, phase sequence, Tong tester and techo

		energy in single phase and three phase circuit. Tong tester and its use in electrical circuit.	meter.
Professional Skill 31 Hrs.; Professional Knowledge 18 Hrs.	Check and troubleshoot different parts of A.C. motor, different types of starter and it's connection for three phase motor.	Identification of different parts and terminals of AC motor, connection, starting, running of AC motor with DOL and star delta starter. Determine efficiency of three phase induction motor. Slip ring induction motor and starting method. Connection of single phase motor, identification testing and running of same.	Working principle of different types of single phase and three phase induction motor. Construction, characteristic and application of same. Different type of starters and its connection for three phase motor. Single phasing and its prevention, losses and efficiency. Various methods of speed control and braking of AC motors.
Internal Assessment/Examination 03days			

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9. CORE SKILLS

9.1 CORE SKILL- ENGINEERING DRAWING AND WORKSHOP CALCULATION & SCIENCE

Sl. No.	SYLLABUS for WORKSHOP CALCULATION & SCIENCE	Time in hrs.
I.	**Unit, Fractions**	**4**
1	Classification of Unit System	
2	Fundamental and Derived Units F.P.S, C.G.S, M.K.S and SI Units	
3	Measurement Units and Conversion	
4	Factors, HCF, LCM and Problems	
5	Fractions – Addition, Subtraction, Multiplication and Division	
6	Decimal Fractions - – Addition, Subtraction, Multiplication and Division	
8	Solving Problems by using calculator	
II.	**Square Root: Ratio and Proportions, Percentage**	**6**
1	Square and Square Root	
2	Simple problems using calculator	
3	Application of Pythagoras Theorem and related problems	
4	Ratio and Proportions	
5	Direct and Indirect proportion	
6	Percentage	
7	Changing percentage to decimal	
III.	**Material Science**	**8**
1	Types of metals	
2	Physical and Mechanical Properties of metals	
3	Types of ferrous and non-ferrous metals	
4	Introduction of iron and cast iron	
5	Difference between iron and steel, alloy steel and carbon steel	
6	Properties and uses of rubber, timber and insulating materials	
IV.	**Mass, Weight, Volume, and Density**	**4**
1	Mass, volume, density, weight & specific gravity	
2	Related problems for mass, volume, density, weight & specific gravity	
V.	**Speed and Velocity, Work Power and Energy**	**12**
1	Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation	
2	Related problems on speed and velocity	
3	Potential energy, Kinetic Energy and related problems with related problems	
4	Work, power, energy, HP, IHP, BHP and efficiency	
VI.	**Heat &Temperature and Pressure**	**12**
1	Concept of heat and temperature, effects of heat, difference between heat and temperature	

2	Scales of temperature, Celsius, Farenhieght, Kelvin and Conversion between scales of temperature	
3	Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation	
4	Co-efficient of linear expansion and related problems with assignments	
5	Problem of Heat loss and heat gain with assignments	
6	Thermal conductivity and insulators	
7	Boiling point and melting point of different metals and Nonmetals	
8	Concept of pressure and its units in different system	
VII.	**Basic Electricity**	**12**
1	Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC and their comparison, voltage , resistance and their units	
2	Conductor, Insulator, types of connections- Series and Parallel,	
	Ohm's Law, relation between VIR & related problems	
3	Electrical power, energy and their units, calculation with assignments	
4	Magnetic induction, self and mutual inductance and EMF generation	
5	Electrical Power, HP, Energy and units of electrical energy	
VIII.	**Mensuration**	**10**
1	Area and perimeter of square, rectangle and parallelogram	
2	Area an Perimeter of Triangle	
3	Area and Perimeter of Circle, Semi-circle , circular ring, sector of circle, hexagon and ellipse	
4	Surface area and Volume of solids- cube, cuboids, cylinder, sphere and hollow cylinder	
5	Finding lateral surface area , total surface area and capacity in liters of hexagonal, conical and cylindrical shaped vessels	
IX.	**Levers and Simple Machines**	**6**
1	Simple machines, Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relation between efficiency, velocity ratio and mechanical advantage	
2	Lever and its types	
X.	**Trigonometry**	**6**
1	Measurement of Angle, Trigonometrical Ratios, Trigonometric Table	
2	Trigonometry-Application in calculating height and distance (Simple Applications)	
	Total	**80**

Sl. No.	SYLLABUS for ENGINEERING DRAWING	Time in hrs.
1.	**Engineering Drawing – Introduction** Introduction to Engineering Drawing and Drawing Instruments – • Conventions • Viewing of engineering drawing sheets. • Method of Folding of printed Drawing sheet as per BIS SP: 46-2003	1
2.	**Drawing Instrument** • Drawing board, T-square, Drafter (Drafting M/c), Set squares, Protector, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), pencils of different grades, Drawing pins/ Clips.	1
3.	**Free hand drawing of** • Lines, polygons, ellipse etc. • Geometrical figures and blocks with dimension • Transferring measurement from the given object to the free hand sketches. • Solid objects – Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone with dimensions. • Free hand drawing of hand tools and measuring tools, simple fasteners (nuts, bolts, rivets etc.) trade related sketches	10
4.	**Lines** • Definition, types and applications in drawing as per BIS: 46-2003 • Classification of lines (Hidden, centre, construction, extension, Dimension, Section) • Drawing lines of given length (Straight, curved) • Drawing of parallel lines, perpendicular line • Methods of Division of line segment	2
5.	**Drawing of Geometrical figures:** Definition, nomenclature and practice of – • Angle: Measurement and its types, method of bisecting. • Triangle: different types • Rectangle, Square, Rhombus, Parallelogram. • Circle and its elements • Different polygon and their values of included angles. Inscribed and circumscribed polygons	8
6.	**Lettering & Numbering** • Single Stroke, Double Stroke, Inclined.	6
7.	**Dimensioning and its Practice** • Definition, types and methods of dimensioning (functional, non-	4

	functional and auxiliary) • Position of dimensioning (Unidirectional, Aligned) • Types of arrowhead • Leader line with text • Symbols preceding the value of dimension and dimensional tolerance.	
8.	**Sizes and layout of drawing sheets** • Selection of sizes • Title Block, its position and content • Item Reference on Drawing Sheet (Item list)	2
9.	**Method of presentation of Engg. Drawing** • Pictorial View • Orthographic View • Isometric View	2
10.	**Symbolic representation – different symbols used in the trades** • Fastener (Rivets, Bolts and Nuts) • Bars and profile sections • Weld, Brazed and soldered joints • Electrical and electronics element • Piping joints and fitting	6
11.	**Projections** • Concept of axes plane and quadrant • Orthographic projections • Method of first angle and third angle projections (definition and difference) • Symbol of 1st angle and 3rd angle projection in 3rd angle.	15
12.	Orthographic projection from isometric projection	15
13.	Reading of fabrication drawing	8
	TOTAL	**80**

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9.2 CORE SKILL - EMPLOYABILITY SKILLS

Syllabus for Employability Skills (160 Hrs.)		
Module	**Topics**	
1. Behavioural Skills	**Duration: 10 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.	
Role Modeling	Adopting best practices and aspire to follow success stories of individual for personal development.	
2. English Literacy	**Duration: 30 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 Formal & Informal communication Speak and provide information about workplace Discussions on current happenings.	
Reading	Reading simple sentences about: a) Self b) Work c) Environment	

Written English	Simple writing skills
3. Communication Skills	**Duration: 20 Hrs.** **Marks: 8**
Self- Introduction	Interview Skills/Confidence Building
Perception Management	Professionalism and Display of same at the institute and work place.
a. Verbal Communication	Understand the usage of appropriate words to express themselves Communicate effectively on telephone.
b. Non-Verbal Communication	Manage Personal Hygiene and Presentation
	Positive body language: adopt and use it appropriately to build a positive impression
	Different spatial zones: Understanding and need to maintain it, create safe zones for communication
	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.
	Handling setbacks/rejection and recover from it with an action plan.
	Developing strong professional contacts/network to gain support in learning process and career as a whole.
4. I.T. Literacy	**Duration: 20 Hrs.** **Marks: 08**
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, CD, DVD etc, Introduction to inbuilt windows apps, Tools and features.
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
MS-Excel	Basics of Excel worksheet & its importance Creating simple worksheets Adding and average functions Printing of simple excel sheets
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: 20 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. Ways to set up an enterprise and different aspects involved viz., legal compliances, Marketing aspect, Budgeting, etc. Day to day monitoring mechanism for Maintaining an enterprise. Different Government schemes supporting entrepreneurship. Examples of successful and unsuccessful entrepreneurs.
6. Maintaining Efficiency at Workplace	**Duration: 10 Hrs.** **Marks: 03**
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: 10 Hrs.** **Marks: 03**
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, ground water, global warming

	Responsibility about the environment Segregation and disposal of waste
Environmental ethics	Different actions people that affect others and the environment.
Disaster Management	Types, causes & effects, areas in India that are prone to be affected, preparedness & mitigation, dos and don'ts- Before, During and After any Disaster, how to reduce man-made disasters.
8. Essential skills for success	**Duration: 10 Hrs.**	**Marks: 03**
Essential skills for success	Building basic skills to navigate life and career. Self-Awareness, articulating personal values, Value-based decision making, Dilemma situations. Identify sources and types of stress (positive / negative stress), Managing stress (long-term / short-term), Handling rejection and building resilience, Identify day wasters.
9. Labour Welfare Legislation	**Duration: 05 Hrs.**	**Marks: 1.5**
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.
10. Quality Management	**Duration: 05 Hrs.**	**Marks: 1.5**
Quality Concept and Consciousness	Create awareness on introduction of quality Concepts.
Concept of Quality Management (QMS) & PDCA	Concept of Quality Management (QMS), PDCA, Fishbone, 5S, 5D, KAIZEN
Concept of ISO	Introduction of ISO
11. Preparation to the world of work	**Duration: 10 Hrs.**	**Marks: 03**
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.
12. Customer Interaction / service	**Duration: 10 Hrs.**	**Marks: 03**
Greeting customers	Forms of greeting
Probing-understanding customer requirements	Use of positive body language

Handling grievances	Handling grievances (Use of ask-listen-repeat technique)
Relationship building with customers	Relationship building with customers, importance of probing.
To identify the importance of probing	Use of open-ended/ close-ended questions to gauge requirement

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10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

BROAD LEARNING TO BE COVERED IN INDUSTRY FOR ELECTRICIAN (INTEGRATED STEEL PLANT) TRADE:

1. **COKE OVEN:-** **Duration :- 150 hrs.**

Maintenance of electrical systems, motors, switches, control panels etc. in the following equipments of coke oven by product.

- Battery machines

  Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc

- Pusher Car

  Trolley line inspection and maintenance. Its breaker Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Leveller bar

  Its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Charging Car

  Trolley line inspection and maintenance. its breaker. Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Coke guide Car

  Trolley line inspection and maintenance. its breaker , Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Coke Bucket Car

  Trolley line inspection and maintenance. its breaker , Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels,

Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Stand pipe and goose neck and attachment related to hydraulic main
  Its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Flushing liquor pump
  Its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Coal tower equipment
  Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Pipe line, pumps, gas coolers
  Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- CDCP –Lifting arrangement and Mill fan.
  Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- ETP (Electrostatic Tar Precipitator)
  Mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Main exhauster
  Mechanism its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Coolers- Primary coolers and Secondary coolers

Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

- Ammonia Crackers

  Different mechanism, its power and control breakers panels, interlocks. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders etc.

2. BLAST FURNACE:- Duration :- 150 hrs.

- All the Raw Material feeding conveyors.
  Flow diagram of Raw material feeding conveyor.
  a. Control scheme, power scheme, inter lock.
  b. Operating voltage levels for control PLC and power to motors.

- Bell less Top
  a. Complete operations of BLT with various inter locks,
  b. Weight measurement system,

- All the Hydraulic and Pneumatic system
  a. Hydraulic power pack, loading /unloading cycle, inter lock with pressure, temperature etc.
  b. Pneumatic system –Pneumatic motor, operating air pressure.

- Hot Blast stoves and its operation
  a. Mode of operation.
  b. Sequences of operation with inter locks.
  c. Isolation of furnace through back draught valve.

- Slag transportation conveyors

  Slag transportation conveyors with electrical inter locks, various operating voltage level, control and power scheme.

- Mudgun Drill Machine

  Mud Gum drill I/C., Operation with inter locks, control desk operation with various electrical, hydraulic inter locks.

- Pump house equipments and Actuators
  a. Total electrical know how with control scheme, power scheme with inter locks.

b. What is actuator and how to set the limits of operation.

- ESPs of DE systems
  a. Functional description, its importance and complete electrical scheme with inter lock.
  b. Safety precautions to be taken while wkg in ESPs as it is at dangerous at high voltage level from 50kv to 100kv

- Gate valves of Raw material
  a. Raw material bunker gate valve its operation , with sequencing with charging programme
  b. Opening and closing of inter locks

- Dust extraction air fan
  a. No. of DE fans, how it is to be S/O N duty /stand by concept
  b. No. of pulses, HT voltage level, ABB drive with inter locks (electrical & mechanical)

- Stoves combustion air fan
  Description of panels, electrical inter locks, no. of pulses , HT voltage, functional description of ABB drives

- Respective panels of all the drives.
  Hands on training, how to set parameters, significance of codified alarms and its meaning

- Shut down procedure

3. <u>STEEL MELTING SHOP</u>:- Duration:- 150 hrs.

- **Lance & Sub Lance Drives**
  a. Take shut down & ensure no power
  b. Blowing of all panels /drives & motors
  c. Tightening of all connections at panel as well as at field
  d. Meggering of all motors from panel
  e. Measure brake coil resistance from panel end
  f. All measured values to be laogged

- **Converter Tilting**
  a. Take shut down & ensure no power
  b. Blowing of all panels /drives & motors at panel as well as field
  c. Tightening of all connections at panel as well as at field
  d. Meggering of all motors/Thrustor & hydraulic brake motors
  e. All measured values to be laogged

- **Bulk Material Charging System & Ferro Alloy Vibro Feeders**
  a. Take shut down & ensure no power
  b. Blowing of all panels /drives & motors at panel as well as field
  c. Tightening of all connections at panel as well as at field
  d. Tightening of all foundation bolts of unbalance motors
  e. Meggering of all motors from panel
  f. Meggering of control cables
  g. All measured values to be laogged

- **Ladle Transfer Car/Slag Transfer Car**
  a. Take shut down & ensure no power
  b. Blowing of all panels /drives & motors at panel as well as field
  c. Tightening of all connections at panel as well as at field
  d. Cable reeling drum/Hose reeling drum checking for cable/hose looseness
  e. Meggering of all motors/Thrustor & hydraulic brake motors
  f. All measured values to be laogged

- **Ladle Furnace Transformer & Its 33KV Breaker**
  a. Take shut down & ensure no power
  b. Operate outgoing isolator for earting HT bus
  c. Cleaning of all insulators and tightning of its mounting
  d. Tightening of all connections
  e. Air blowing & tightening in marshalling box
  f. Blowing,cleaning & tightening of breaker panel
  g. Breaker contact pressure checking

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- **Maintenance of WTP/GCP**
  a. Take shut down & ensure no power
  b. Blowing of all panels /drives & motors at panel as well as field
  c. Tightening of all connections at panel as well as at field
  d. Motor foundation bolt tightening
  e. Meggering of motor/actuator from panel
  f. All measured values to be logged

- **Maintenance of EOT Cranes**
  a. Take shut down & ensure no power
  b. Blowing of all panels /drives & motors at panel as well as field
  c. Tightening of all connections at panel as well as at field
  d. Greasing of jockey rollers

e. Trailing cable loop adjustment
f. Cleaning of brake core/limit switch/proximity switch & encoders
g. Meggering of all motors/thyristors
h. Measuring of brake coil resistance
i. All measured values to be logged

- **Maintenance of Shop/Bay Lighting**
  a. Take shut down & ensure no power
  b. Cleaning of reflectors/glass of lighting fixture
  c. Tightening of all connection at panel/field terminals

4. <u>RMHS</u>:- **Duration :- 100 hrs.**

- Inspection, Repair and maintenance of various electrical switchgear panels and equipment like transformers, motor control panels, power distribution boards etc.
- Laying, Jointing and termination of different types and sizes of cables/wires.
- Repair/ replacement /maintenance of all defective parts of luminaries (light fittings) of both indoor and outdoor.
- Cleaning and maintenance of all electrical panels and equipment and keeping them in neat and good condition.
- Maintenance of all the safety switches like pull cord, belt sway, zero speed , cute block etc. of conveyor system.
- Inspection, repair and replacement of (small) electrical motors and cable termination works of all the motors.
- Repair and replacement of all the defective parts in electrical switchgear and field control panels/stations.
- Maintenance of electrical earthing and lightning protection system.
- Maintenance of all field instruments like sensors, level switches, limit switches, transmitters, flow meters etc.

21. <u>HOT STRIP MILL</u>:- **Duration :- 150 hrs.**

- Power control system
  a. Operation and maintenance of MV MCC and MV Switchgears
  b. Maintenance of Oil filled Transformers and Dry type Transformers
  c. Maintenance of LV PCC, MCC, PDB and MLDB
- Electro hydraulics

a. Level switches, Position and Pressure transducers and Hydraulic valves
b. Remote I/O panels

- Power management of roll tables, rolling stand, coiler
  a. Maintenance of Motors
  b. On field devices
  c. Automation sensors
  d. VVVF drives
- Power management in water supply system
  a. Flow meters, Pressure switches, Level switches
  b. Operation and maintenance of motors
- Emergency power operation.
  a. Emergency operation of Tunnel furnace
  b. Emergency operation of water supply system

22. <u>THIN SLAB CASTER</u>:- **Duration :- 100 hrs.**

- Turret maintenance – Movement of turret in different direction
  a. Inspection and Preventive Maintenance of Panels, Motors & Cables, and Field equipments-Limit switches, Proximity switches, Sensors & Encoders, Instruments, etc.
- Oscillator maintenance.
  a. Inspection and Preventive Maintenance of Panels& Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders, Instruments, etc.
- Caster Machine (Tundish Cars and Roll Tables) & Hydraulics.
  a. Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders, Instruments, etc.
- Movement of dummy bar.
  a. Inspection and Preventive Maintenance of Panels, Motors, Field equipments-Limit switches, Proximity switches, Sensors & Encoders, Instruments, etc.
- Maintenance of shearing machine.
  a. Inspection and Preventive Maintenance of Panels, Motors& Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders, Instruments, etc.
- Pump house maintenance.
  Inspection and Preventive Maintenance of Panels, Motors & Cables, Field equipments-Limit switches, Proximity switches, Sensors & Encoders, Instruments, etc.

7. <u>GENERAL TRAINING</u>:- Duration:- 100 hrs.

i. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.).
ii. Record keeping and documentation.
iii. Replacing the bulbs, tubes, fans, sockets, plugs, trouble shooting, repair & maintenance. Wire up in PVC casing & capping.
iv. Domestic appliances: Connecting, testing, repairing & maintaining.
v. Install pipe & plate earth stations Measure earth resistance, improve the same & maintain earth stations.
vi. Operation & maintenance Air compressor, AC plant, cranes, lifts, hoists.
vii. Trouble shoot & repair machine tools Preventive &corrective maintenance of all machine tools.
viii. Operation & maintenance of Transformer substation, circuit breakers, batteries etc.
ix. Trouble shoot & repair the problems in Rectifiers, power supplies, stabilisers, thyristor circuits, etc.
x. Measurement of various process parameters related to INTEGRATED STEEL PLANT. Process control system and PID controllers.
xi. Working with hydraulic & Pneumatic components and circuits. Proportional and servo hydraulics.
xii. Testing and study of IGBT, Demo of a real time microprocessor based AC drive used in different processes in industries.
xiii. Practice the shut down procedure.
xiv. Connection and disconnection of motor in the circuit.
xv. Direct on line starting of motors.
xvi. Operation and maintenance of DG set and auto changeover of power supply.
xvii. Parallel operation of transformer.
xviii. Tap changer of transformer and its operation.
xix. Load change over from one source to other off line and online.

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ANNEXURE-I

List of Tools & Equipment			
ELECTRICIAN (INTEGRATED STEEL PLANT) (For batch of 20 candidates)			
Sl.No.	**Name of the Tool & Equipments**	**Specification**	**Qty**
A. TRAINEES TOOL KIT			
1.	Measuring Steel Tape	5 Mtr	20
2.	Combination plier insulated	200mm	20
3.	Screw Driver Insulated Diamond Head	4 X 150mm	20
4.	Screw driver insulated	6 X150mm	20
5.	Electrician screw driver insulated handle thin stem	4 X 100MM	20
6.	HEAVY DUTY SCREW DRIVER INSULATED 5 X 200mm		20
7.	Electrician Screw Driver thin stem insulated handle	4 X 250MM	20
8.	Punch Centre	9 X 150MM	20
9.	Knife Double Bladed Electrician	100MM	20
10.	Neon Tester	500V	20
11.	Steel Rule Graduated both in Metric and English Unit	300mm with precision of 1/4th mm	20
12.	Hammer, cross peen with handle	250Gm	20
B. SHOP TOOL, INSTRUMENTS & MACHINERY			
13.	Crimping Tool	1.5 sq mm to 16 sq mm	2
14.	Crimping Tool	16 sq mm to 95 sq mm	2
15.	Wire Cutter and Stripper	150mm	4
16.	CONTACTOR 3-ϕ	25A ,415V,2NO & NC AUXLLIARY CONTACTS	2
17.	CONTACTOR3-ϕ	32A, 415V, .2NO & NC AUXLLIARY CONTACTS	2
18.	LIMIT SWITCH lever operated	2A, 500V, 2 contacts	2
19.	ROTARY SWITCH	16A, 440V	2

20.	Pin type, shackle type, Egg type & suspension type insulators including Hardware fitting		2 Each
21.	Hydrometer		2
22.	Hand Drill Machine 0-6mm Capacity		2
23.	Portable Electric Drill Machine with Chuck & Key	0-12mm, Cap 750W, 240V	1
24.	Load bank 6 kw (lamp/heater type)	3 Phase	1
25.	Brake test arrangement with two spring balance	0 TO 25 Kg. RATING	1
26.	Laboratory type induction coil	1000W	2
27.	Series test lamp	230V, 60W	4
28.	Knife switch dptd fitted with fuse terminal	16Amp	4
29.	Knife switch tptd fitted with fuse terminal	16Amp,440V	4
30.	Miniature Breaker	16Amp	2
31.	Earth Plate Copper Plate	60 X 60 cm X 3.15mm	1
32.	Earth Plate GI Plate	60 X 60 cm X 6mm	1
33.	Earth Electrode Primary Electrode Secondary CU Strip	2100 X 28 X 3.25mm 20 X 5mm	1
34.	MCCB, Tripple Pole	100Amp	1
35.	ELCB & RCCB, Double Pole & Double Pole Ian	25Amp, 25Amp, 30ma	1 Each
36.	Fuses HRC Glass Rewire Type		4 Each
37.	Rheostat Sliding Type	a) 0 - 25Ohm, 2 Amp b) 0 - 300Ohm, 2 Amp c) 0 - 1Ohm, 10 Amp d) 0 - 10Ohm, 5 Amp	1 1 1 1
38.	Capacitors: Electrolytic,Ceramic,Polyestar,Film,Variable,Dual run		12
39.	Various Electric Components (As Req)	-	As required

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40.	Various Lamps Halogen Incandescent Lamp, Fluorescent tube,HP mercury vapor Lamp, High-pressure sodium Lamp,Low-pressure, sodium Lamp, LED		1 Each
41.	Plug socket, Piano Switch, Lamp Holder	230 V, 5 A	2 Each
42.	Cables : Twisted Pair, Non-Metallic Sheathed Cable, Underground Feeder Cable, Ribbon Cable, Metallic Sheathed Cable, Multi- Conductor Cable, Coaxial Cable, Direct-Buried Cable		1 Mtr Each
43.	Bus bar with brackets	1 Mtr Each	3
44.	Rubber Mat	2' X 4' X 1"	2
45.	RCC Pole 6 mtr with Accessories (MS Angle Iron , C Clamp, Stay Insulator, Etc)		1
46.	OHMMETER SERIES &SHUNT TYPE Portable Box Type	0/2000Ohm	2 Each
47.	Digital Multi Meter DC	200mv - 1000v,0 – 10A & AC 200mv- 750v , 0-10A, resistance 0-20 MÙ and 3 1/2 digit	10
48.	A.C. Voltmeter M.I. analog, portable box type housed in Bakelite case Multi range	75 V - 150V - 300V -600V	3
49.	Milli Voltmeter centre zero analog, portable box type housed in Bakelite case	100-0-100mv	2
50.	Ammeter MC analog, portable box type housed in Bakelite case	0- 500mA, 0-5A, 0-25A	2 Each
51.	AC Ammeter MI, analog, portable box type housed in Bakelite case	1 A, 0-5 A, 0-25 A	2 Each
52.	Kilo Wattmeter Analog, pressure coil rating-, current rating-Analoge, portable type Housed in bakelite case	0-1.5-3KW, 240v/440v, 5A/10A	2
53.	Digital Wattmeter	230 V, 1 KW, 50 Hz	2
54.	A.C. Energy Meter Single Phase,	10 A, 240 V induction type	2
55.	A.C. Energy Meter Three Phase,	15 A , 440 V induction type	2
56.	Power Factor Meter Digital portable box type	440 V, 20 A, Three Phase	2

57.	Frequency Meter	45 to 55 Hz	2
58.	Magnetic Flux Meter	0-500 tesla	2
59.	Lux meter lux meter LCD read out	0.05 to 7000 lumens with battery	2
60.	Tachometer Analog Type	10000 RPM (CONTECT TYPE 1750/-)	1
61.	Tachometer Digital Photo Sensor Type	10000 RPM	1
62.	Tong Tester / Clamp Meter (Digital Type)	0 - 100 A	2
63.	Megger Analog	500 V	2
64.	Wheatstone bridge complete with galvanometer & battery		2
65.	Single Phase Variable Auto Transformer (Air cooled)	0 - 270 V, 10Amp	2
66.	Phase Sequence Indicator	3 Phase, 415 V	2
67.	STARTERS FOR	2 TO 5H.P, AC MOTORS	
	(A) Resistance Type Starter		1
	(B) Direct Online Starter		1
	(C) Star Delta Starter Manual		1
	(D) Star Delta Starter Semi Automatic		1
	(E) Star Delta Starter Fully Automatic		1
	(F) Star Delta Starter Soft Starter		1
	(G) Auto Transformer Type		1
68.	Soldering iron		2
	25 watt,		
	65 WATT		2
	120 WATT		2
69.	Temperature controlled Soldering Iron	50W, 230V	2
70.	Discrete Component Trainer Discrete Component (for diode and transistor circuit) with regulated power supply	+5,0- 5 V,+12 ,0-12 V	2
71.	Oil Testing Kit Oil Testing Kit	230 V, single phase 50 Hz 60 VA output 0-60 KV Variable	1
72.	DC Power Supply	0 - 30 V, 5 A	2
73.	Battery Charger	0 - 6 - 9 - 12 - 24 - 48 V, 30amp	1
74.	Current Transformer	415 V, 50Hz, CT Ratio 25 /	2

		5 A, 5VA	
75.	Potential Transformer	415 V, 50Hz, PT Ratio, 440V/110V, 10VA	2
76.	PENTIUM IV COMPUTER OR LATEST(SERVER-LINUX)	2.8 GHz & above,1GB ram 80GB HDD, DVD Combo Drive,19/21`` Monitor, Optical scroll mouse, Multimedia key board,32 bit lan card with UPP port necessary drivers, etc or Latest Version	2
77.	Ink jet/laser printer		1
78.	AC Squirrel Cage Motor with star delta starter and triple pole iron clad switch fuse with Mechanical Load.	5 HP, 3-Phase, 415 V, 50 Hz	1
79.	AC phase-wound slip ring Motor with starter switch	5 HP, 440 V, 3 - Phase, 50 Hz	1
80.	Universal Motor with starter/switch	240 V, 50 Hz, 1 HP	1
81.	Single phase Transformer, core type, air cooled	1 KVA , 240/415 V, 5	3
82.	Three phase transformer, shell type oil cooled with Delta/ Star	3 KVA	2
83.	Electrical Machine Trainer		1
84.	Diesel Generator set with change over switch, over current breaker and water/air-cooled with armature, star-delta connections AC-3 phase 5 KVA , 415 volt or higher rating		1
C. SHOP FLOOR FURNITURE AND MATERIALS			
85.	Working Bench	2.5 m x 1.20 m x 0.75 m	4

86.	Wiring Board projection on the top	3 meter x1 meter with 0.5 meter	1
87.	Instructor's table		1
88.	Instructor's chair		2
89.	Metal Rack	100cm x 150cm x 45cm	4
90.	Lockers with drawers		1
91.	Almirah	2.5 m x 1.20 m x 0.5 m	1
92.	Black board/white board	minimum 4X6 feet	1
93.	Fire Extinguisher Co2 type	2Kg	2
94.	Fire Buckets Standard Size		2

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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

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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.	P. Sahoo Ex. ED, Roukela Steel Plant	M. Tech. (Elect.)	35 years experience of electrical maintenance of steel industry	Member
3.	G.R.Dinesh, DGM(MRS) NISP, Nagarnar	BE(Elect.)	15 years experience of electrical maintenance	Member
4.	S.N.Buxy Ex. DGM(Elect.) BSP	BE (Elect.)	35 years experience of electrical maintenance of steel industry	Member
5.	SMS Iyer Ex. GM (Elect.) Blast furnace, BSP	M. Tech. (Elect.)	35 years experience of electrical maintenance of steel industry	Member

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