WIND POWER PLANT TECHNICIAN (ELECTRICAL)

COMPETENCY BASED CURRICULUM

(Duration: 1 Yr. 03 months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4

SECTOR – GREEN JOB

सत्यमेव जयते

GOVERNMENT OF INDIA

MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP

DIRECTORATE GENERAL OF TRAINING

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

WIND POWER PLANT TECHNICIAN (ELECTRICAL)

(Designed in 2020)

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NSQF LEVEL - 4

Developed By

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

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1. TATA Motors Ltd. , Gujarat
2. Vadodara Enviro Channel Ltd., Gujarat

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

Co-ordinator for the course: Sh. J P Meena, Regional Director

Sl. No.	Name & Designation Shri/Mr./Ms.	Organization	Mentor Council Designation
Expert group on restructuring of Apprenticeship Training Modules			
1.	J P Meena, Regional Director	RDSDE, Gujarat	Convener
2.	Anand Vyas, TATA State Head-Government & Public Affairs	M/S TATA Motors Ltd. , Gujarat	Member
3.	Satish Panchal, Managing Director	Vadodara Enviro Channel Ltd., Gujarat	Member
4.	Deepak Rai, Head Standards and Research	Nominee from SSC	Member
5.	Mayuri Kantibhai Prajapati, Principal, Class 1	DET, Gujarat	Member
6.	Anilkumar Patel, Superintendent, GIA ITI Rajendranagar, Ta Bhiloda, Di. Sabarkantha, Gujarat	Representative from ITIs	Member
7.	A K Rarhi, Deputy Director	CSTARI, Kolkata	Member
8.	Ketan Patel, Deputy Director	RDSDE, Gujarat	Member
9.	Ramasubramanian, Deputy Director	DGT, New Delhi	Member

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10.	Ajay Agrawal, Training Officer	NSTI(W) Vadodara	Member
11.	Vijay kumar, Training Officer	NSTI, Hydrabad	Member
12.	B A Rao, Training Officer	RDSDE Vijaywada	Member
13.	B S Arun Kumar, Head Renewable	TATA project Ltd, Bangalore	Vetting Member
14.	S. James, Managing Director	SolaxRenergy LLP, Bangalore	Vetting Member
15.	S Dhananjaya, Director	Renergy Power Systems Pvt. Ltd., Bangalore	Vetting Member
16.	Geetha, CEO	Temco Renewable Energy Solutions, Bangalore	Vetting Member
17.	Rama Siva, Founder	Anthro Power	Vetting Member
18.	Priyank R Harsurkar, Manager	BEL, Bangalore	Vetting Member
19.	Ramesh Bhandiwaddar, Deputy Manager	BEL, Bangalore	Vetting Member
20.	Dr. C S Mala, HOD	TCE BMS Institute of Technology, Bangalore	Vetting Member
21.	B N Sridhar, Deputy Director	FTI, Bangalore	Vetting Member
22.	C Ramasubramanian, Deputy Director	Apex Hi-Tech Institute, Bangalore	Vetting Member
23.	Shanthi G, Deputy Director	MGIRED, Bangalore	Vetting Member
24.	Malathi R, Training Officer	RVTI, Bangalore	Vetting Member
25.	Palani, Training Officer	ATI, Hyderabad	Vetting Member
26.	A Vijaya Kumar, Training Officer	ATI, Hyderabad	Vetting Member
27.	M P Rajan, VI	ATI, Calicut	Vetting Member
28.	Anupama, JTO	ITI, Peenya	Vetting Member
29.	Uma Shankar Bhargav, JTO	ITI, Hosur Road	Vetting Member
30.	Lingaraj Gowda, JTO	ITI, Hosur Road	Vetting Member
31.	Venkatesh Reddy, JTO	BTC, Bangalore	Vetting Member
32.	SRC Sathyanarayan	Sri Ranga Consultancy	Vetting Member
33.	N Sridhar	KASSIA	Vetting Member
34.	Harshad Rathod, Sr. Manager (Project)	ZF Steering Gear (India) Ltd. 1242/1244, Vadu Budruk, Shirpur,	Vetting Member

WIND POWER PLANT TECHNICIAN (ELECTRICAL)

		Pune-412216 (MS)	
35.	Piyush Konjasiya, Site In-Charge(Mota Gunda S)	Siemens Gomesa Renewable Power Pvt. Ltd., 66 KV Mota Gunda Sub Station, Jampur Road, Mota Gunda	Vetting Member

CONTENTS

1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by Directorate General of Training (DGT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by DGT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

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

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

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. The vocational training programmes are delivered under aegis of Directorate General of Training (DGT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of DGT for propagating vocational training.

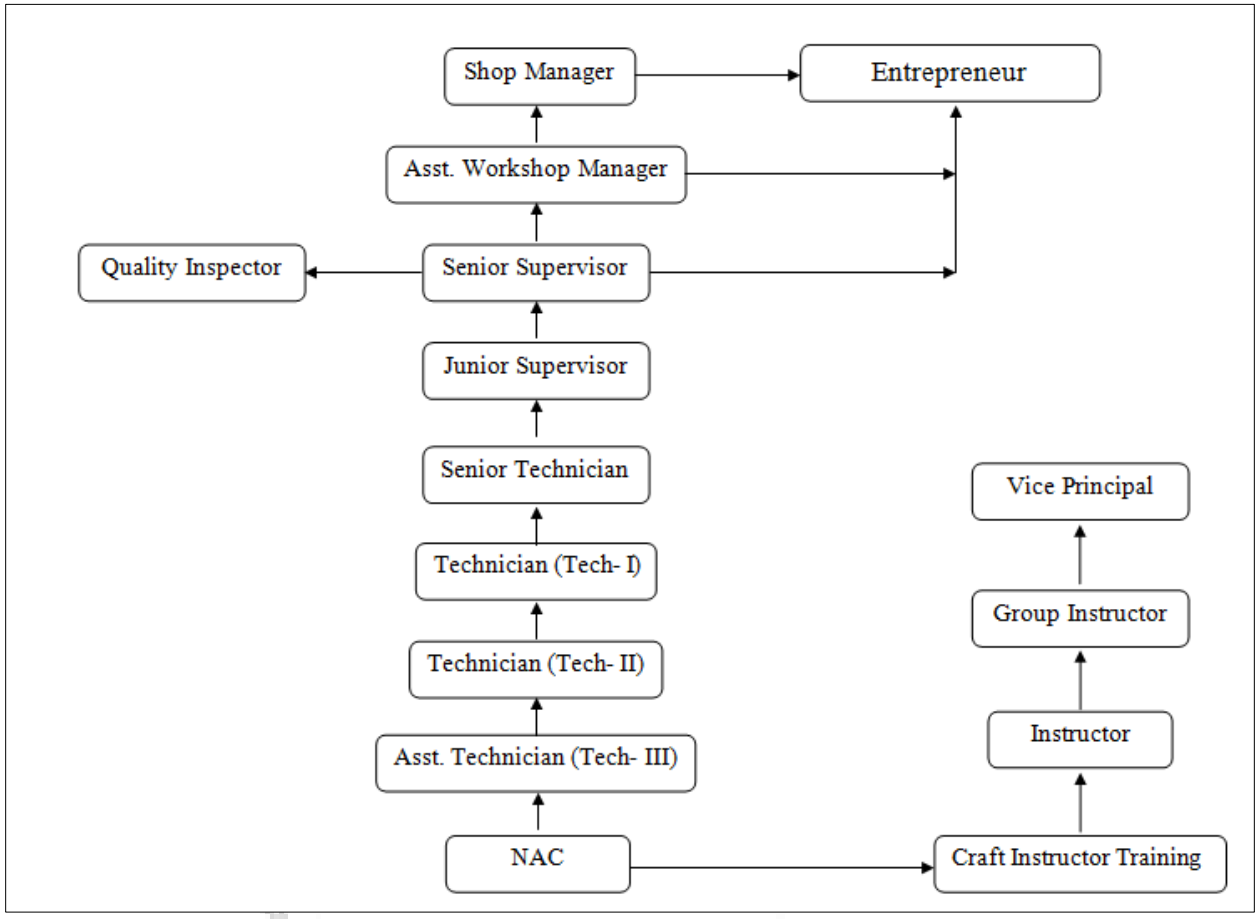
Wind Power Plant Technician (Electrical) trade under ATS is of one year 03 months (15 months) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by DGT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of One year 03 months (*Basic Training and On-Job Training*): -

Total training duration details: -

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

*Block-II is defined only in case of qualifications having two year ATS durations.

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)
For 01 yr. 03 month course (Engg.) :-(**Total 03 months:** 03 months in 15 months)

SL. No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	**For 01 Yr. course**
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	**1000**	**500**

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 15 month course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by DGT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check** individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate should pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards 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
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester

examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles:

Wind power plant installation Technician (Electrical): The wind power plant Installation Technician is responsible for installing electrical components of wind power plant .

Wind Power Plant Maintenance Technician(Electrical): He is responsible for maintenance and effective functioning of the installed wind power plant . The individual have to carry out the testing of transformers, switch Gear and protection devices.

Reference NCO-2015: 3131.9900 - Power Production Plant Operators, Other

4. NSQF LEVEL COMPLIANCE

NSQF level for Wind Power Plant Technician (Electrical)trade under ATS: **Level 4**

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

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

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

a. Process
b. Professional knowledge,
c. Professional skill,
d. Core skill and
e. Responsibility.

The Broad Learning outcome of Wind Power Plant Technician (Electrical) trade under ATS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

Level	Process required	Professional knowledge	Professional skill	Core skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice.	Factual Knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment.	Responsibility for own work and learning.

5. GENERAL INFORMATION

Name of the Trade	**Wind Power Plant Technician (Electrical)**
NCO-2015	3131.9900
Trade Code	DGT/3202
NSQF Level	Level –4
Duration of Apprenticeship Training (Basic Training + On-Job Training)	15 Months
Duration of Basic Training	BT : 03 months Total duration of Basic Training: 03 months
Duration of On-Job Training	OJT : 12 months Total duration of Practical Training: 12 months
Entry Qualification	Passed 10th Class examination with science and mathematics or its equivalent
Space Norms (BTP Workshop)	50Sq. m
Power Norms (BTP Workshop)	3 KW
Selection of Apprentices	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	Degree in Electrical Engineering with one year post qualification experience in relevant industry OR Diploma in Electrical Engineering with two years post qualification experience in relevant industry OR ITI in Electrician/Wireman Trade with 3 years post qualification experience in relevant Industry
Infrastructure for Basic Training	Refer Annexure – I
Examination	The internal examination/ formative assessment will be held on completion of course. Final examination for all subjects will be held at the end of course and same will be conducted by DGT.
Rebate to Ex-ITI	Basic Training – 3 Months Rebate is allowed to any one of Electrician, Electrician – Power Distribution, Wireman, Electronic Mechanic, Technician Power Electronics and Mechanic Consumer Electronic Appliances trade CTS

	passout.

Note:

- *Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to DGT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Wind Power Plant Technician (Electrical) course of 01 year 03 months duration under ATS.

Block I:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, Mensuration, Trigonometry, Heat & Temperature, Power transmission, Pressure].*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Lines, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Electrical & electronic symbol].*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Follow safety procedures for electrical installations by selection of proper tools & measuring instruments.
2. Assemble, install and test wiring system & carry out soldering and crimping.
3. Construct and test various characteristics of electrical and magnetic circuits.
4. Perform basic Electric energy calculations and understand transmission and distribution of electrical power.

5. Test & Calibrate on transformers, protective relays and sequence relays.
6. Measure Earth Resistance, Insulation resistance & Perform Earthing with Surge arrestors, lightning arrestors.
7. Test a commercial wiring installation by using Megger & join power cable.
8. Identify Generator Terminal, Practice connections of Generator.
9. Trouble shoot wind power plant circuits
10. Measure Power factor & Power in star – delta connected systems
11. Evaluate windiness of a place using an anemometer & prepare a report on site suitability for windmill.
12. Install, operate & maintenance of grid connections.
13. Prepare a report on wind mill energy conversion system through sufficient audio visual sessions.
14. Test model windmill with a blower and record the observations.

NOTE:

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

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
Learning Outcomes	**Assessment Criteria**
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1.2 Recognize and report all unsafe situations according to site policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1.4 Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1.5 Identify and observe site policies and procedures in regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.8 Identify and observe site evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
	1.12 Identify environmental pollution & contribute to avoidance of same.
	1.13 Take opportunities to use energy and materials in an environmentally friendly manner
	1.14 Avoid waste and dispose waste as per procedure
	1.15 Recognize different components of 5S and apply the same in the working environment.

2. Understand, explain different mathematical calculation & science in the field of study including basic electrical andapply in day to day work.*[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation &earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*	3.1 Read & interpret the information on drawings and apply in executing practical work.
	3.2 Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3.3 Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record	4.1 Select appropriate measuring instruments such as micrometers, Vernier calipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the

data.	instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally usingavailable resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7.1 Explain personnel finance and entrepreneurship.
	7.2 Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7.3 Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8.1 Use documents, drawings and recognize hazards in the work site.
	8.2 Plan workplace/ assembly location with due consideration to operational stipulation
	8.3 Communicate effectively with others and plan project tasks.
	8.4 Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
<u>Block-I</u>	

*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I** (section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	1. Preventive measures for electrical accidents and use of fire extinguishers. 2. Practice elementary first aid and artificial respiration. 3. Disposal procedure of waste materials. 4. Use of personal protective equipment. 5. Familiarization with signs and symbols of electrical Accessories. Workshop practice on filing and hacksawing, sawing, planning, drilling and assembling for making a wooden switchboard.	Scope of the trade. Safety rules and safety signs. Types and working of fire extinguishers. First aid safety practice. Hazard identification and prevention. Response to emergencies, e.g. power failure, system failure and fire etc. Concept of Standards and advantages of BIS/ISI. Trade tools specifications. Electrical symbols. Introduction to National Electrical Code-2011.
2	6. Prepare an open box from metal sheet. 7. Practice on skinning, twisting and crimping. 8. Identify various types of cables and measure conductor size using SWG and micrometer. 9. Make joints on single strand conductors. Practice in crimping and soldering of joints / lugs.	Fundamentals of electricity. Concept of current, voltage, power, resistors and capacitors. Generation of DC electricity. Electrical conductors and insulators. Differentiate between AC and DC current. Types of joints and techniques of soldering. Ohm's Law; Simple electrical circuits and problems.
3	10. Measure parameters in combinational DC circuits by applying Ohm's Law for different resistor values and voltage sources. 11. Measure current and voltage in DC circuits to verify Kirchhoff's Law.	Kirchoff's Laws and applications.Series and parallel circuits.Open and short circuits in series and parallel networks.Series and parallel combinations of resistors. Magnetic terms, magnetic materials and properties of magnet.

	12. Verify laws of series and parallel circuits with voltage source in different combinations. 13. Measure current and voltage and analyse the effects of shorts and opens in series and parallel circuits. 14. Verify the characteristics of series parallel combination of resistors.	Electrostatics: Capacitor- Different types, functions, grouping and uses. Inductive and capacitive reactance and their effect on AC circuit. Concept of Wind Energy & Power calculations. Wind resource assessment.Power Conversion Technologies and applications.Wind Power estimation techniques andcapacity of wind mills.
4	15. Determine the poles and plot the field of a magnet bar. 16. Identify various types of capacitors, charging / discharging and testing. 17. Test AC circuit with resistive loads , Inductive loads 18. Measure power, energy for lagging and leading power factors in single phase , three phase circuits. 19. Ascertain use of neutral by identifying wires of a 3-phase 4 wire system and find the phase sequence. 20. Measure the Power of three phase circuit for balanced and unbalanced loads.	Comparison and Advantages of DC and AC systems. Sine wave, phase and phase difference. Related terms frequency, Instantaneous value, R.M.S. value Average value, Peak factor, form factor, power factor and Impedance etc.Active and Reactive power. Single Phase and three-phase system.Advantages of AC poly-phase system.Concept of three-phase Star and Delta connection. Line and phase voltage, current and power in a 3 phase circuits with balanced and unbalanced load.
5	21. Practice testing / fault detection of domestic and industrial wiring installation and repair. 22. Practice control panel wiring using wiring accessories and mounting of control elements, e.g. meters, fuses, relays, switches, push buttons, MCB, ELCB etc. 23. Prepare test boards / extension boards and mount accessories like lamp holders, various switches, sockets, fuses, relays, MCB, ELCB, MCCB etc.	I.E. rules on electrical wiring. Types of domestic and industrial wirings. Study of wiring accessories e.g. switches, fuses, relays, MCB, ELCB, MCCB, switchgears etc. Grading of cables and current ratings. Principle of laying out of Domestic wiring. Voltage drop concept. PVC conduit and Casing-capping wiring system. Different types of wiring Power, control, Communication and entertainment wiring.

6	24. Practice cutting, threading of different sizes & laying Installations. 25. Prepare different types of earthing and measure earth resistance by earth tester / megger. 26. Connections an Identify various conduits and different electrical accessories. 27. Drawing layouts and practice in PVC Casing-capping, Conduit wiring with minimum to number of points as per IE rules. 28. Wire up PVC conduit wiring to control one lamp from two different places using two way switch.d testing of Protective Devices 29. Practice Installation of lightening arrestor.	Wiring circuits planning, permissible load in sub-circuit and main circuit. Importance of Earthing. Plate earthing and pipe earthing methods and IEE regulations. Earth resistance and earth leakage circuit breaker. Lightening arrestor. Wind Turbine Generators: Induction, Synchronous/ asynchronous generators, constant V & F and variableV & F generations, Reactive power compensation.
7	30. Identify and practice of various analog and digital measuring Instruments.	Classification of electrical instruments and essential forces required in indicating instruments. PMMC and Moving iron instruments. Range extension.
8	31. Practice on measuring instruments in single and three phase circuits e.g. multi-meter, Wattmeter, Energy meter, Phase sequence meter and Frequency meter etc. 32. Test single phase energy meter for its errors.	Wattmeter, PF meter, Energy meter, Megger, Earth tester, Frequency meter, Phase sequence meter, Multimeter, Tong tester etc. Instrument transformers – CT and PT.
9	33. Measure power consumption for different loads with various times of use and calculate watt-hour. 34. Find out power ratings from product label and prepare a load calculation chart.	Calculation of total watt hour of all loads per day and daily average watt hour from twelve months electricity bill. Working principle of transformer. Electric power demand, supply and gap in city, state and national level.
10	35. Verify terminals, identify components and calculate the	Conventional energy Generation by thermal (coal, gas diesel) and hydel power

	transformation ratio of single phase transformers. 36. Perform OC and SC test to determine and efficiency of single phase transformer.	plant. (small and large) Advantages of high voltage transmission. Wind Energy: Wind Energy Conversion, Potential, Nature of the wind, Wind Data and Energy Estimation, Site selection, Types of wind turbines, Wind farms, Wind Generation and Control., classification of wind, characteristics, offshore wind energy – Hybrid systems, wind energy potential and installation in India.
11	37. Test various diodes , Thyristors Connect and Test different Controlling devices , Drives	Electronics in Electrical Circuits : Electronic components, Electronic devices used in control circuits. Semiconductors, Semiconductor devices, Diode, Transistor, FET, MOSFET, IGBT, GTO.
12	38. Visit to transmission / distribution substation. 39. Draw actual circuit diagram of substation visited and indicate various components. 40. Repeat Electrical major fitting practices. Clarify difficult points in Electrical wiring and substation control points	Transmission network of India. Study of distribution of power and substation. Overhead v/s underground distribution system. Non-renewable and Renewable energy concept. Advantages over non renewable energy; brief discussion main renewable energy resources viz. solar (PV and thermal), wind, Biofuel, Biomass, small hydro, Tidal power, Wave power, Geo thermal energy etc., Construction,working of Wind Power plant , Main Components. Site Selection,Concept of wind form &project cycle,Cost andeconomic viability of wind farm.
13	**Revision & Examination**	

NOTE: -

- *More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.*

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration : - 30 hrs.)**
1	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units.	**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, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips
2	**Fractions & Simplification**: Fractions, Decimal fraction, Addition, Subtraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple Simplification using BODMAS.	**Lines :** - Definition, types and applications in Drawing as per BIS SP: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
3	**Square Root** : Square and Square Root, method of finding out square roots, Simple problem using calculator.	**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
4	**Ratio &Proportion:** Simple calculation on related problems.	**Lettering and Numbering** as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.
5	**Percentage:** Introduction, Simple	**Free Hand sketch:** Hand tools and measuring

	calculation. Changing percentage to decimal and fraction and vice-versa.	instruments used Electrician trade
6	**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.	**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.
7	**Mass, Weight and Density**: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	**Symbolic Representation** (as per BIS SP:46-2003) of : - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings.
8	**Work, Power and Energy**: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	**Construction of Scales and diagonal scale** **Three phase Induction motor :** Free hand sketching of Slip-ring and Squirrel cage Induction motor. Typical wiring diagram for drum controller operation of A.C. wound rotor motor.
9	**Algebra:** Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Drawing the schematic diagram of Autotransformer starter, DOL starter and Star Delta Starter. Drawing the schematic diagram of A.C. motor speed control by SCR /AC Drive.
10	**Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.	**Distribution of Power** Types of insulator used in over head line. (Half sectional views) Different type of distribution systems and methods of connections. Lay out diagram of Wind Power Plant Layout diagram of a substation.
11	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables. Finding height and distance by trigonometry.	Single line diagram of substation feeders.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 55 HRS.)

Topic No.	Topic	Duration (in hours)
	English Literacy	7
1.	Reading Reading and understanding simple sentences about self, work and environment	
2.	Writing Construction of simple sentences Writing simple English	
3.	Speaking / Spoken English Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.	
	I.T. Literacy	10
1.	Basics of Computer Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	Word processing and Worksheet Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets. Use of External memory like pen drive, CD, DVD etc,	
3.	Computer Networking and INTERNET Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication.	
	Communication Skill	18
1.	Introduction to Communication Skills Communication and its importance Principles of Effective communication Types of communication - verbal, nonverbal, written, email, talking on phone. Nonverbal communication - components-Para-language Body - language Barriers to communication and dealing with barriers.	

2.	Listening Skills Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
3.	Motivational Training Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.	
4.	Facing Interviews Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
Entrepreneurship skill		8
1.	Concept of Entrepreneurship Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2.	Institutions Support Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes& procedure & the available scheme.	
Productivity		
1.	Productivity Definition, Necessity.	
2.	Affecting Factors Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	Personal Finance Management Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
Occupational Safety, Health & Environment Education		6
1.	Safety & Health Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2.	Occupational Hazards Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	

3.	Accident & safety Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4.	First Aid Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
Labour Welfare Legislation		
1.	Welfare Acts Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
Quality Tools		6
1.	Quality Consciousness : Meaning of quality, Quality Characteristic	
2.	Quality Circles : Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	
3.	House Keeping : Purpose of Housekeeping, Practice of good Housekeeping.	
4.	Quality Tools Basic quality tools with a few examples	

10. DETAILS OF COMPETENCIES (ON THE JOB TRAINING)

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

Block – I

1. Follow safety procedures for electrical installations by selection of proper tools & measuring instruments.
2. Assemble, install and test wiring system & carry out soldering and crimping.
3. Construct and test various characteristics of electrical and magnetic circuits.
4. Perform basic Electric energy calculations and understand transmission and distribution of electrical power.
5. Test & Calibrate on transformers, protective relays and sequence relays.
6. Measure Earth Resistance, Insulation resistance &Perform Earthing with Surge arrestors, lightning arrestors.
7. Test a commercial wiring installation by using Megger & join power cable.
8. Identify Generator Terminal , Practice connections of Generator
9. Trouble shoot wind power plant circuits
10. Measure Power factor & Power in star – delta connected systems
11. Evaluate windiness of a place using an anemometer & prepare a report on site suitability for windmill.
12. Install, operate& maintenance of grid connections.
13. Prepare a report on wind mill energy conversion system through sufficient audio visual sessions.
14. Test model windmill with a blower and record the observations.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.

2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

WIND POWER PLANT TECHNICIAN (ELECTRICAL)			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Measuring Steel Tape	5 meter	21 (20+1) Nos.
2.	Combination Plier Insulated	200 mm	21 (20+1) Nos.
3.	Screw Driver Insulated	4mm X 150 mm, Diamond Head	21 (20+1) Nos.
4.	Screw Driver Insulated	6mm X 150 mm	21 (20+1) Nos.
5.	Electrician screw driver thin stem insulated handle	4mm X 100 mm	21 (20+1) Nos.
6.	Heavy Duty Screw Driver insulated	5mm X 200 mm	21 (20+1) Nos.
7.	Electrician Screw Driver thin stem insulated handle	4mm X 250 mm	21 (20+1) Nos.
8.	Punch Centre	9mm X 150 mm	21 (20+1) Nos.
9.	Knife Double Bladed Electrician	100 mm	21 (20+1) Nos.
10.	Non-Contact Voltage Tester	90V to 1000V (AC)	21 (20+1) Nos.
11.	Steel Rule Graduated both in Metric and English Unit	300 mm with precision of 1/4th mm	21 (20+1) Nos.
12.	Hammer, cross peen with handle	250 grams	21 (20+1) Nos.
B. SHOP TOOLS & EQUIPMENT			
(i) List of Tools & Accessories			
13.	Electrical Symbol and Accessories Charts		04 nos.
14.	Pipe vice Cast Iron with hardened jaw open type	100 mm	2 Nos.
15.	Hand Vice	50 mm jaw	2 Nos.
16.	Table Vice	100 mm jaw	2 Nos.
17.	Hacksaw frame (with blade)	Adjustable 300 mm Fixed 150 mm	2 Nos. Each
18.	File flat	200 mm 2nd cut with handle	2 Nos.
19.	File half round	200 mm 2nd cut with handle	2 Nos.
20.	File round	200 mm 2nd cut with handle	2 Nos.

21.	Pliers long nose insulated	150 mm	4 Nos.
22.	Pliers flat nose insulated	200 mm	4 Nos.
23.	Pliers, round nose insulated	100 mm	4 Nos.
24.	D.E. metric Spanner Double Ended	6 - 32 mm	2 Set
25.	Gauge, wire imperial stainlees steel marked in SWG & mm	Wire Gauge – Metric	2 Nos.
26.	Portable Electric Drill Machine	0-12 mm capacity 750W, 240V with chuck and key	1 No.
27.	Crimping Tool	1.5 sq mm to 16 sq mm 16 sq mm to 95 sq mm	1 No. Each
28.	Pliers Side Cutting	150 mm	2 No.
29.	Wire stripper adjustable length		2 No.
30.	Hammer, ball peen With handle		2 No.
31.	Scriber (Knurled centre position)		2 No.
32.	Tool kit Box/bag portable		5 No.
33.	Allen Key		1 Set
34.	Scissors blade	150 mm	2 No.
35.	Electrical loads: set of Incandescent lamp, Tube light, CFL, LED light, Heater and Geyser	Electrical loads: set of Incandescent lamp, Tube light, CFL, LED light, Heater and Geyser	2 Set
36.	Torque wrench	8N-m to 15N-m	1 No.
37.	Pipe Cutter to cut pipes	upto 5 cm. dia	1 No.
38.	Pipe Cutter to cut pipes	above 5 cm dia	1 No.
39.	Try Square	150 mm blade	2 No.
40.	Multi Meter (analog)	0 to 1000 M Ohms, 2V to 500 V,100 microA to 10A DC and AC	1 No
41.	Load Bank (variable)	Up to 1.2 KW (Lamp / heater Type)	1 No.
42.	Wire Cutter and Stripper	150 mm	4 Nos.
43.	Earth Plate	60cm X 60cm X 3.15mm Copper Plate 60cm X 60cm X 6mm GI Plate	1 Each
44.	Earth Electrode	Primary Electrode 2100x28x3.25mm Secondary Cu Strip 20x5mm	1 No.
45.	Out Side Micrometer	0 - 25 mm least count 0.01mm	2 Nos.
46.	Tap set	Different size	02 Set Each
47.	Trolley for Transportation of Batteries		02 Nos.
48.	Hand drilling machine	Drilling capacity up to 6mm	02 Nos
49.	Die for Threading	Different sizes	02 Set

50.	Electrical wiring and switch gear rack	Electrical control elements suitable for practice of control circuits using banana plugs and sockets	1 No.
51.	Protective relays and contactors rack	suitable for practice of control circuits using banana plugs and sockets	1 No.
52.	MCCB	100Amps, Triple pole	1 No.
53.	ELCB and RCCB	25Amps, double pole and 25Amps, double pole, IΔn 30 mA	1 Each
54.	Fuses	HRC Glass Rewire Type	4 Each
55.	**Cables:** **Twisted Pair** **Nonmetallic Sheathed Cable** **Underground Feeder Cable** **Ribbon Cable** **Metallic Sheathed Cable** **Multi-Conductor Cable** **Coaxial Cable** **Direct-Buried Cable**	1 mtr each	1 Each
56.	Three core wire	(230 V, 15 A)	As required
57.	Battery cable	7.5 sqmm	As required
58.	Resin cored Solder		As required
59.	Solder wax		As required
60.	MC – 4 connector		As required
61.	pins	5 mm	As required
62.	lugs	7.5 mm	As required
63.	Hacksaw blades	200 mm, 300 mm	As required
64.	Bolts, nuts, anchor bolts, washers, screws, other pins, lugs etc		As required
65.	Civil work utensils	spade, mixing spoon, leveling plates	1 Set
66.	Plumbing tools		1 Set
67.	Plumbing raw materials		As required
68.	Civil work raw materials		As required
(ii)	**List of Equipment**		

69.	Multimeter	Digital 0 to 1000 M Ohms, 2V to 700 V,100 microA to 10A DC and AC	02 Nos.
70.	Megger	Analog - 500 V	01 Nos.
71.	Hydrometer		04 Nos.
72.	Pyranometer		01 No.
73.	Magnetic Flux Meter	0-500 tesla	02 Nos.
74.	Tong Tester / Clamp Meter	0 - 100 A (Digital Type)	01 Nos.
75.	Soldering Iron	25 Watt, 65 Watt and 120 Watt, 230 Volt	02 Nos. Each
76.	Temperature controlled Soldering Iron	50 Watt, 230 Volt	02 Nos.
77.	Thermometer Digital	0° C - 150° C	01 No.
78.	Weather monitoring station	To monitor and record Sunshine, wind velocity, temperature, rainfall etc with software.	01 No.
79.	Magnetic compass		04 No.
80.	Motorized Bench Grinder	AC mains operated	01 No.
81.	Anemometer	for wind speed measurement	01 No.
82.	A.C. Voltmeter M.I	0 –500V AC	02 Nos.
83.	Volt meter	0 - 30V	02 Nos.
84.	Volt meter	0 - 100V	02 Nos.
85.	Ammeter MC	0 - 1A	02 Nos.
86.	Ammeter MC	0 - 5A	02 Nos.
87.	Ammeter MCcentre zero	0 - 20A	02 Nos.
88.	Ammeter MCcentre zero	0-50A	02 Nos.
89.	Power Factor Meter		01 No.
90.	Rheostat	0 -1 Ohm, 5 Amp 0 -10 Ohm, 5 Amp 0- 25 Ohm, 1 Amp 0- 300 Ohm, 1 Amp	01 No. each
91.	A.C. Energy Meter	Single Phase, 10 A, 240 V induction type	01 No.
92.	A.C. Energy Meter	Three Phase, 15 A, 440 V induction type	01 No.
93.	Kilo Wattmeter Analog	0-1.5-3KW, pressure coil rating-	02 Nos.

		240v/440v, current rating-5A/10A Analog, portable type Housed in bakelite case	
94.	Digital Wattmeter	230 V, 1 KW, 50 Hz	02 Nos.
95.	Phase Sequence Indicator	3 Phase, 415 V	02 Nos.
96.	Frequency Meter	45 to 55 Hz	02 Nos.
97.	Bench Vice	Jaw opening4inch and 6inch	01 No each
98.	CRO/DSO	Digital , 50 MHz, 2 channel , USB storage	01 No
99.	Wind Vane	For Wind Direction mesurement	02 Nos
100.	Vernier Caliper	0-150mm	01 No
101.	Feeler Gauge		01 No
102.	Dial Gauge	0.25mm-300mm	01 No
103.	Accelrometer	Preferable for vibration measurement	01 No
104.	GFCI	Optional	01 N0
D. SAFETY AND PROTECTIVE EQUIPMENT			
105.	Rubber gloves		10 Pair
106.	Cotton gloves		05 Pair
107.	Gum boots		02 Pair
108.	Safety Goggles		04 Nos.
109.	Safety Helmet		04 Nos.
110.	First Aid kit		02 Nos.
111.	Fire Extinguisher CO_2	2 KG	02 Nos.
112.	Fire Buckets	Standard size	02 Nos.
113.	LV Rubber Gloves	1000V	02 Nos
114.	EYE wash Bottel		01 Nos
115.	Helmet Light	Optional	01 No
116.	Safety Man Hook	For safety purpose	01 No
117.	Insulated Rubber Mat		01 No
118.	Cotton Dress –Full Sleeve	For safety precautions	
119.	Insulated Ladder	For Electrical Safety	01 No
120.	Full body harness(Safety Belt)	Safety equipment For On turbine Activities	01 No
121.	Fall Arrester	Safety equipment for climbing	01 No
122.	Safety Lanyard(Twin Tail)	Safety equipment for On turbine activites	01 No

123.	Work position Rope	Safety equipment for work at height	01 No
D. SHOP FLOOR FURNITURE AND MATERIALS			
124.	Working Bench	2.5 m x 1.20 m x 0.75 m	04 Nos.
125.	Wiring Board	3 meters x 1 meter with 0.5 meter projection on the top	01 No.
126.	Instructor's table		01 No.
127.	Instructor's chair		02 Nos.
128.	Trainee Chair		01 for Each Trainee
129.	Trainee table for two trainee		10 Nos.
130.	Metal Rack	100cm x 150cm x 45cm	04 Nos.
131.	Lockers with drawers		01 for Each Trainee
132.	Almirah	2.5 m x 1.20 m x 0.5 m	01 No.
133.	Black board/white board	(Minimum 4X6 feet)	01 No.

Note: -

1. *All the tools and equipment are to be procured as per BIS specification.*
2. *Internet facility is desired to be provided in the class room.*

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: WIND POWER PLANT TECHNICIAN (ELECTRICAL)
LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

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

2) Infrastructure:

A : TRAINEES TOOL KIT:-			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid 45^o (250 X 1.5 mm)		20+1 set
3.	Set square celluloid 30^o-60^o (250 X 1.5 mm)		20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board (700mm x500 mm) IS: 1444		20+1 set
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board		20
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board	8ft. x 4ft	01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :			**Year of Enrollment :**
Name & Address of ITI (Govt./Pvt.) :			**Date of Assessment :**
Name & Address of the Industry :			**Assessment location: Industry / ITI**
Trade Name :	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														