



GREEN SKILL DEVELOPMENT PROGRAMME (GSDP)

Report on Course :

Certified Laboratory Technicians /Technical Assistants
for Electrical Testing for Environmental Criteria

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT,
FOREST AND CLIMATE CHANGE (MoEF&CC),
NEW DELHI



A Report on Laboratory Technicians /Technical Assistants for Energy Efficiency, Star Labeling and Other Electrical Testing for Environmental Criteria

Ms. Shweta Mahajan

Training In Charge and General Manager - Electrical
(Lighting/Fans/Home Appliances, Motors & Pumps/ Energy cell)
Consumer Education and Research Centre, Ahmedabad

India has made significant progress on energy efficient appliances. Ten home appliances of mass consumption fall under mandatory certification for star labeling. India successfully implemented sustainable LED lights programme and super efficient air conditioning programme through EESL (Energy Efficiency Standards and labeling). Six of India's largest air conditioner manufacturers announced plans to leapfrog from outdated R-410A refrigerant to more climate friendly and lower global warming potential refrigerants such as R-32 and R-29061. Sustainable consumption and production can only be possible with the active support and participation of all stakeholders such as producers, sellers, waste managers and consumers with their consumption and disposal patterns. In today's context of Green Technology, design, raw material, manufacturing and testing have become closely integrated. Industries can make a big difference in global competitions with skilled workforce. Many open positions in industry require specialized skills that require specific training.

Government is showing increased interest in education for sustainable development (ESD) as the key for behavior change under climate action component. CERC has developed holistic customized training programme of 264 hrs for developing green skills of youth on sustainable products, lifestyles and sustainable consumer behavior.

Technically qualified youth was trained in CERC's Electrical product testing laboratory on the concepts of star labeling criteria & eco friendly practices adopted by the industry for sustainable future.

Selection of Candidates:

CERC has given advertisement of training course through print and electronic media.

Large numbers of application were received for this course. Candidates with relevant qualifications were shortlisted and final interviews were conducted via online platforms.

21st and 22nd January. A selection committee comprising of subject experts selected candidates by judging their technical & core capabilities.

Inauguration of the Training programme:

It was held in conference hall, Blind People's Association of Ahmedabad on 09/02/21. Presidential speech was delivered by CERC's trustee Shri Rakeshbhai Shah and welcome address by CEO & Board Secretary, Shri Uday Mawani. CERC's Chairman Shri Prafulbhai Amin encouraged youth with his inspirational speech. Ms. Anindita Mehta, Project Coordinator & CGM CERC briefed about the mandates and awareness activities of CERC ENVIS. Dr. Ashoka Ghosh, Member of Advisory Committee, CERC ENVIS addressed the audience about evolution of Green Skill development Programme. The programme was attended by CERC's management, staff members, prominent industry & academic experts and consultants.

Training:

Training programme was commenced from **9/2/2021**.

All candidates were given bags with course material (training manual, important formulas useful for testing and calculations for deriving results, methods of analysis & solutions under various test conditions) stationary items, testers & safety helmets.

Training manual prepared by Shweta Mahajan was given to each candidate with details on every aspect of testing. It covers introduction of laboratory tools required for preparation of test setup, introduction of instruments and equipments required for performing testing, consumables required during testing, knowledge on calibration of instruments, inspection of test system, primary maintenance & standardized formats for keeping records of every analysis including intermediate checks/cross verifications. It also covers mandatory safety requirements for electrical testing & laboratory operations and quality system for laboratory accreditation with simplified test procedures.

In manual, concepts of star labeling criteria and eco friendly practices adopted by the industry for sustainable future are simplified with methods of identifying eco-friendly star labeled electrical products, details on electrical products covered under energy star labeling criteria by Bureau of Energy efficiency, testing techniques for environmental criteria, green skills for sustainable development with tips & habits to be cultivated to save energy to contribute towards global challenges of climate change.

All details are explained in a creative way with photographs for ease of understanding.

Another manual on cleaner production and waste minimization was given by Gujarat Cleaner Production Centre, Gandhinagar.

Training schedule:

‘Training Schedule’ prepared by Training-In-Charge Ms. Shweta Mahajan was given to all the candidates for the month of February and March 2021.

Internal and external faculty members:

Following Internal & External faculty members/experts have made the training programme interesting and successful with their presentations.

Internal Faculty:

Ms. Shweta Mahajan

External Faculty:

1. Mr. Mihir Vasavada (Subject expert).
2. Mr. G.T. Panchal (Industry Expert).
3. Mr. Govind Zala (Industry Expert-for demonstrations).
4. Mr. Arvind Sotha (Industry Expert- for demonstrations).
5. Mr. Nirav Mehta (Industry Expert)
6. Mr. Hari Om Mehta (Industry Expert)

Major topics covered:

The Syllabus is designed keeping in mind the expectations industry has from job seekers. Suggestions were taken from industry experts & subject experts to make it comprehensive, which covers a broad category of competence levels in terms of professional knowledge, professional skills, core skills, responsibility and process.

1. Recent trends in electrical machines.
2. Renewable energy products for green future (Types & basics)
3. Design aspects of energy efficient induction motors.
4. Process of manufacturing of energy efficient motors for submersible pumps, calculation of losses and finding efficiency.
5. Environmental pollution due to noise created by electrical products, home appliances and accessories .
6. Measurement of noise & methods of reduction of noise.
7. Green practices observed by manufacturers.

8. Products covered under voluntary & mandatory labeling schemes of BEE.
9. Varieties of labels used on appliances as energy saving guides.
10. Sustainable consumption of electrical products.

Demonstration of tests /practicals on Electrical products and Home appliances:

Ms. Shweta Mahajan

Practical training was systematically carried out according to the topics lined out in the course module. Various aspects of product testing including environmental criteria were covered in details as per the descriptions given in the training manual.

Candidates benefitted from learning comprehensive testing techniques and hands-on experience on the instruments.

They were given exposure to the tests for Sound level measurement, air flow measurement, energy consumption and derivations for star label with demonstration on electrical products; LED lamps, LED fluorescent tubes, LED night lamps, star rated cooling fans, fan regulators, exhaust fans, fresh air fans, refrigerators, hand blenders, mixers/grinders & food processors.



They were given training on power consumed by unsustainable products and power saved with energy efficient & star labeled products with green technology. They were also given hands on experience for testing, analysis and reporting of test results as per NABL guidelines.



Candidates gained clear knowledge on how reduction in carbon foot prints is linked with reduction in power consumption which further causes reduction in demand of power and automatically reduces demand for fossil fuels (coal) which helps in saving the environment. Thus, clear understanding was given on natural philosophy of engineering including mathematical and scientific knowledge constituting the pure theory of engineering operations and philosophy of maintenance & attitude.

Demonstrations on testing of Submersible Pump sets

Candidates were explained about the methodology of interpretation of Indian standards on submersible pump sets with other relevant references of main specification and amendments.

They were introduced to test systems, equipments, instruments & test setup required for performing the tests. Basic knowledge was given on operation of instruments as per standard operating procedure (SOP) and conducting analysis as per standard operating test procedures (SOTP).

They were made well versed with instrumental analysis to obtain quantitative scientific data, spread sheets and graphs. They were given exposure to sequential type tests & D-section of products

Candidates were evaluated for competency on the basis of everyday interactions with them on learning capabilities, ability for working in groups, capacity of performing the tests independently and presentation of conclusion of test results with remarks.



Faculty members invited to give exposure to entrepreneurship:

1. Mr. Chandramauli Pathak
2. Mr. Kashyap Vachcharajani (Expert on finances for startups)

Lectures on Consumer complaints and role of CERC was given by the Complaints department and presentation on Misleading Advertisements was given by Education & Research Department.

Visit to M/S LA-Gajjar Machineries Pvt. Ltd. on 01-03-2021

We visited two different factories of LA-GAJJAR. One for V6 pump sets (Agricultural Application) and second for domestic pump sets (V3 & V4 type).

Company follows 5-S system in their manufacturing process. [SORT : when in doubt, move it out, SET in order - place for everything in its place, SHINE: Clean and Inspect or Inspect through cleaning, STANDARDISE: Make rules, follow these and enforce them, SUSTAIN : Make it as part of daily work and it becomes a habit].

Candidates learnt the detailed manufacturing process of energy efficient submersible pump sets. They also had interactions with factory officers on quality aspects maintained at factory level.

Site-1: Visit to factory at Rakhiyal:

Candidates gained detailed knowledge on manufacturing process for rotors used in V6 pump sets. They learnt about rotor stamping process, bracing of coil fixture, balancing of rotor (Brass ring application), polishing and finishing (Inner & Outer) with rough file, shot blasting of rotor shaft, powder coated painting process, oven heating at 90 degree Centigrade for drying the coating and final balancing (with drilling management).

Candidates also gained knowledge on manufacturing process of stator used in V6 pump sets. They learnt about stamping process for stator (24 slots & 0.5 mm thickness), welding process for stamping [MIG welding (metal Insert Gas)], finishing of stator slots with filing process, buffing and cleaning process of stator body, inserting of slot paper in stator slots, winding of motor (manual process), crimping of winding wires with monoplast, omega and PVC tape.

All were shown the assembling of motor body with fitting process of upper & lower housing after insertion of rotor and fitting of bearing with segment (4 segment carbon-Pressure cup, oil seal, upper cap, flange & circlip process).

SITE-2: Visit to factory site at Amraiwadi.



This factory is manufacturing stators. All candidates were shown the manufacturing process for stators including, filing process, ultrasonic cleaning process to remove burrs and slot paper filling/insertion. Manual winding process was shown with coil filling.

Different machineries used in the factory were shown with processes like coil lapping process with starting and running coil machine, slot paper inserting machine, shaping machine, lacing machine, crimping machine ,Panel for final testing to check the quality of winding, winding resistance, IR, Surge test etc. Varnish process on winding, Heating in oven at temp of 150 to 175 degrees centigrade C (3 min),cable checking area, Epoxy mixing area, stacking press area, Rotor press area ,Oil filled area (V4 motor),oil seal process ,air leakage tester and Cable fitting.

Report on visit to Naroda Enviro Plant Ltd, NEPL on 12/03/21.

Object of the visit: To get exposure on common effluent treatment plant and scientific landfill. Mr. Ajay Patel, Director NEPL explained the candidates about the four industrial areas in Ahmedabad and how the waste from industries and domestic sewage is treated at central effluent treatment plant(CETP) with three main processes: Primary treatment , Secondary treatment & Tertiary treatment.

Candidates were shown three transformers and electrical panels used for pumping system. Candidates were also shown the control panel room. It has automatic control test system with HMI programming based monitoring screen. They had a small test model for treatment.



Visit to Savio Sun Energy on 10/03/21.

Objective of the visit:

- Training on assembling of components used for manufacturing of renewable energy products, their application & maintenance.

Participant were given exposure of Renewable Energy products like

1. Solar based LED street lights
2. Warning lights on high ways, schools , hospitals and
3. Solar based LEDs used in advertising boards.



Warning lights with lithium Ferro phosphate cells were shown with four components used in this product; PWM, Battery, Controller, Inverter

- Batteries are used with series and parallel connections. 3.2 volts, 6 Ah batteries was used. Battery connections were shown in details with micro controller. They are manufacturing these as per NHAI guidelines (National Highway Authority of India).

- Renewable energy products used on high ways for dividers(Warning lights) :It has one round PCB with 300 mm diameter & 180 LEDs (ultra bright) with 5 mm diameter (45 parallel and 4 series).casing of warning light is made from poly carbonate material and it conforms to IP 65 protection
- Renewable energy products used on Highways (street lights) :It has a rating of 9v,30w/50w,150 Lumen. It costs from Rs 8000 to Rs 25000/-. 9 LEDs are used. (Each LED is rated for 1v). These solar based LED street lights are manufactured to meet with MNRE guidelines. It gives visibility up to 1km.
- Renewable energy products used on Highways and roads (advertising boards): LEDs used in these boards are called as P6 and P10 type with 5v, 60A, and power supply. Resolution of P6 is good. It has more number of LEDs to get more visibility.
- Solar rooftop (independent off grid system) for temple



Visit to waterman industries Pvt. Ltd. On 06/03/2021

Waterman Industries is India's first pump manufacturing company to receive ZED MARK (zero defect zero effect) certificate with silver rating.

During visit, candidates were shown all sections including purchase, design, quality, store and compete factory premises. They were explained about quality management system of factory [as per ISO 9001- 2015,ISO 14001-2015 and BS OHSAS 18001-2007]and SHEQ policy observed by company on conservation of energy & natural resources, raw material, use of efficient & environment friendly technology, wherever possible & effective waste management.



Final evaluation of trained candidates:

Candidates were assessed for skills acquired by them through written test (100 marks) and practicals of 100 marks (75 marks of practicals & 25 marks of Viva - Voce). Final evaluation of candidates was made on the basis of assessment criteria for level 6 NSQF qualifications. Successful candidates were awarded with certificates during online valedictory function held on 01/04/21.

Career counseling and placement of candidates:

Career counseling sessions were held on professionalism and ethics, interpersonal interactions, quality consciousness, accountability and needs of industry for competence levels with professional skills and leadership qualities.

For giving opportunities and experience of company interviews, HR departments of following companies were requested.

1. Nirdhara Energy and IT solutions
2. Bhagvati industries, Ahmedabad
3. LA-GAJJAR machineries Pvt. Ltd. Ahmedabad.
4. Kirloskar Brothers Ltd, Sanand.
5. Waterman industries Pvt.Ltd, Changodar.
6. Savio Sun Energy
7. Mamata Machineries Pvt. Ltd



A placement brochure was prepared with the CV's of all the trainees. It was circulated among the solar manufacturer, pump manufacturer and other electrical testing companies.

One trainee got placed at Waterman Industries Pvt. Ltd, Ahmedabad
One trainee placed with Mak Pumps Industries, Ahmedabad)
One trainee got placed at CYIENT, Hyderabad
One trainee employed at Airport Authorities of India Ltd, Porbandar
One trainee employed at Airport Authorities of India Ltd, Diu
One trainee is exploring start up on renewable energy products at Gandhidham)
Two trainees selected for apprenticeship by La Gajjar Machineries Pvt. Ltd
Three trainees opted for competitive exams or higher studies

Feedback:



I am Vijay Deshmukh and I am from Nagpur. I joined this course to learn about electrical testing. During the course I have learned about testing of household appliances, pump testing, star labeling, solar sets, sources of renewable energy etc. I have gained knowledge on how to acquire five star labeling for electrical appliances and BIS standards. Our course Incharge has taught us very well on the subject and has guided us throughout the course. Thankyou.



I am Shubham Shukla. During the course, I have attended many field visit, guest lectures, practicals and regular lectures. In practical sessions, I have learned about energy efficiency of a product, environmental impact of an electrical appliance, quality assurance etc. During a visit to a manufacturing company, I learned about the eco-friendly practices adopted by them. I have improved my technical skills as well as communication skills here. Thank you for enrolling me in this course.



My name is Sejal Devadiya and I am from porbandar. First of all I want to thank the whole team of GSDP for giving me this opportunity to learn and improve my skills. Here, I have attended practicals and theory lectures. During Practicals, I learned about how star labeling is done, environmental impact of an electrical product, electrical testing, how to manufacture less polluting products etc. During field visit I have learned about submersible pump –its testing, manufacturing, production etc. We have also given an opportunity to learn about financing and entrepreneurship skills through guest faculties. This has been a beneficial course for me and it has helped me in developing my confidence. I want to thank the team of GSDP



Report Compiled by :

ENVIS - Resource Partner
Consumer Education and Research Centre (CERC)
507-8, Sakar 2, End of Ellishbridge, Elishbridge
Ahmedabad - 380006, Gujarat
www.cercenvis.nic.in



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Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi-110003



+91-11-24695386



www.envis.nic.in / www.gsdp-envis.gov.in



gsdp-envis@gov.in