

2020-2021 प्रशिक्षण कैलेंडर Training Calendar



एनपीटीआई के साथ पावर सेक्टर का सुनिश्चित सम्पूर्ण विकास



National Power Training Institute

(An ISO 9001:2015 & 14001:2015 Organisation)
Ministry of Power, Government of India
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*“In this age of
globalization,
we have no
option but to make
a quantum leap in
energy production
and connectivity.”*

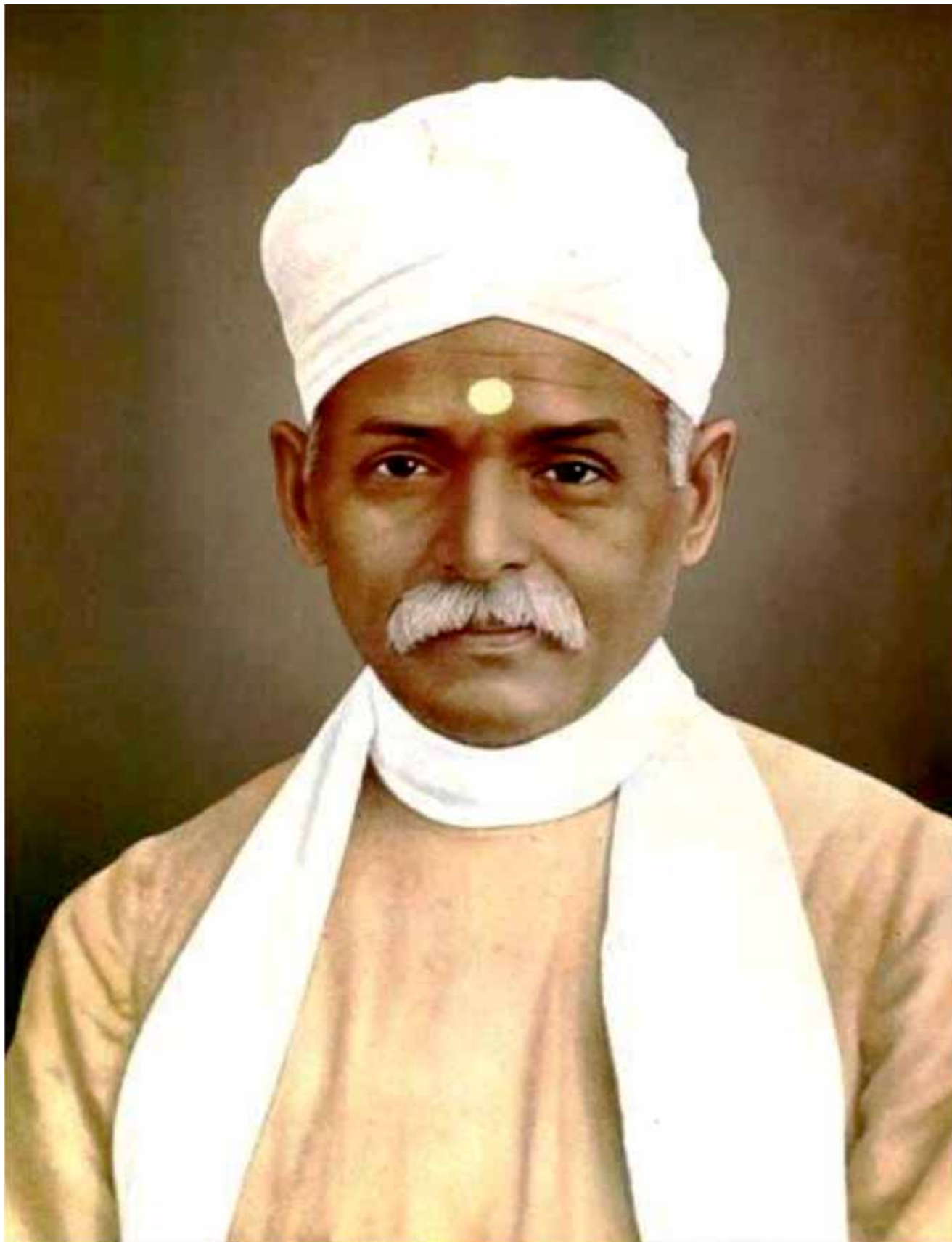
**Shri Narendra Modi
Hon'ble Prime Minister of India**



Our Source of Inspiration...



Shri R. K. Singh
Hon'ble Minister of State (IC)
(Power and New & Renewable Energy)
&
Minister of State
(Skill Development and Entrepreneurship)



भारत की एकता का मुख्य आधार है
एक संस्कृति, जिसका उत्साह कभी नहीं टूटा!
यही इसकी विशेषता है!

मदन मोहन मालवीय

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FOREWORD



The National Power Training Institute (NPTI) is a National Apex Body for training Power Sector Utilities Professionals and Manufacturing Organisation's Technical workforce who are involved in Power Components since more than Five decades. NPTI has trained more than **3,20,000** Professionals in various areas of Power Sector and related interface industries.

Indian Power Sector is in evolving era with upcoming Renewable Energy, Energy Storage, and Electric Vehicles penetration in existing Grid Structure with variable dynamics. The existing Regulatory Framework addresses Power Utilities providing energy with Coal and Hydro, in general. The intermittency of Renewable Energy is well known by now globally, and its impact on existing Thermal Power Stations and Hydro Power Stations operational strategy need to be re-looked and addressed by new regulatory framework upcoming. It is envisioned that sudden penetration of Renewable Energy at any interface points of Large Grid may impact not only the local Distribution System, but also may change the power flow dynamics in the most undefined way, which in-turn can affect the prevailing operational scenario of entire power network and therefore the Regulatory Framework should also be dynamic in large renewable Penetration era.

With emerging Smart Grid era in the Power Sector and with evolving Computational Intelligence and Information Technology as an integral part of advanced power control, the Utilities must come up with upgrading operational strategy for Network reliability and quality power. Indian Power Sector which has been envisioned as Smart Grid architecture in order to ensure 24x7 power supply to all citizens of India needs appropriate technology integration suitably in place. In order to address the quality and reliable power to all, it is required to have Smart Distribution System along with Smart Transmission & Generation utilising Information and Communication Technology for efficient network operation also. Since India is operating as one Grid, one frequency to ensure 24x7 electricity to all citizens of India with new India Mission, it is mandatory to have modified operational strategy to ensure fastest economic growth to compete globally. In order to meet national power sector requirements, NPTI has introduced Post Graduate Diploma Courses in Power Plant Engineering, Smart Grid Technologies, Power System Operation, Renewable Energy & Grid Interface Technologies and Power Management and also Short-term programs for the Utilities capacity building by offering both induction level programs and existing manpower up-gradation training programs with upcoming/ changing technology being adopted by the Utilities/Power Industries. The training is being given to both fresh Engineering Graduates through an advanced utility-centric academic program which is based on current utility's need and specially designed for working professionals at each level.

In order to facilitate the Distribution Utilities, existing technical workforce at different levels NPTI is going to start training programs in the area of Smart System and components with National Smart Grid Mission, Ministry of Power, Govt. of India. It is right time to make awareness about Renewable Energy integration in the Grid with Smart Control and Intelligent Architecture (SCIA) at appropriate levels starting from Distribution, Transmission and Generating Systems. While handling the scenario of Greening the Grid, E-mobility and it's impact on the overall transmission performance, it is required to critically examine the role of Stakeholders along with advanced technology integration in order to optimally utilise the existing infrastructure to the full capacity. It is known that Energy Market Dynamics may change with upcoming large penetration of Renewable Energy by 2022, therefore, NPTI has started many Short-term courses, organised workshops/conferences for the Power Utilities and Stakeholders to re-orient the mind-set to optimise the performance of related sectors. Recently, a specialized training program for System Operators has been taken up jointly by NPTI, POSOCO and GIZ Germany to prepare workforce of Renewable Energy Management Centre. This workforce will be fully responsible to manage the Grid operations in renewable Energy era.

NPTI has been recognised as Training, assessment and Certification Authority and given responsibility by MoRD to train persons under DDU-GKY at all India basis. With the declared agenda of Hon'ble Prime Minister for 175 GW Power Generation with Renewable Energy by 2022 which includes Solar, Wind and Bio-Energy, recently upgraded to 450 GW by 2030. The in-depth understanding of technicalities in RE sector manufacturing, operation will be one of the most important areas of training and up gradation. The development in last 5 years on Solar Rooftop and Land-based Power Plants have been relatively encouraging and as India move further, the advancement of distribution system

becomes mandatory, as this at present is load intensive and in future may become generation intensive with more renewable energy penetration in respective distribution system. The technological development of sub-stations especially at 11/0.4 KV, 33/11 KV and 132/33 KV need to be undertaken for safer grid operation with large RE penetration impact. This will not only ensure the further development of Solar Power and Wind Power in the remote villages, but will also facilitate power evacuation through existing sub-stations in reversible mode (Power supplied by the power consumers [prosumers], once they become generating units with more Renewable Energy addition). Therefore, to attain the energy security, it is mandatory for Utilities and entire Industries to come forward to adopt new technology interventions with R&D inputs in existing utility framework.

NPTI has also started training programs on Hydropower Generation Plants with Upcoming Renewable Energy Mix: Design, Operation, Economic Evaluation, Energy Market with Bidding Mechanism in Open Access & Prevailing Rules and Upcoming Regulations in Legal Framework. Five different special Modules have been offered for Hydro Power Sectors.

NPTI has recently established Multi-Functional Simulators in its 06 Institutes which has provisions of simulating 210 MW, 500 MW and 800 MW/600 MW supercritical which is replica of NTPC Thermal Power Plants. CCGT of 550 MW and Hydro 250 MW is also Replica of actual Power Plants. A separate 800 MW Supercritical Simulator has been established at NPTI Corporate Office, Faridabad which is Replica of Kudgi Thermal Power Plant of NTPC and the training for both 800 MW/600 MW Supercritical is being given at present. In this Simulator all units can be synchronised at a time and the Net Power Flow can be established in the Transmission System Model. The load connected in the Distribution System has been integrated as an actual Smart Distribution System of Indian Utilities. Apart from this, Renewable Energy has been integrated in the existing Transmission System and the impact study of Renewable Energy intermittency can be simulated and analysed from the angle of performance of lowest to highest Power Plants capacity, and also CCPP & Hydro Power Plants. This training facilitates in-depth analytical approach adopted in understanding the plant performance and control, once the Renewable Energy penetration is changed due to uncertain nature or solar irradiance changes. The power control has been introduced with the concept of controlling the entire performance both in Transmission and Distribution Systems in order to ensure Grid voltage and Grid frequency to remain within the acceptable limits such that plant connected to the Grid are not going to trip/unstable or also not going to adversely impact to the Transmission and Distribution performance.

This is a unique simulator developed so far which has complete facility of not only simulating the replica of actual Power Plants of NTPC but also understanding the control performance with changing operating conditions. The smart control design can also be demonstrated within the framework of operational boundary in the existing simulator, and this may provide an opportunity to power system Engineers to take up necessary steps for planning in Transmission/Distribution/Generation control for any dynamical load changes/generation changes due to intermittency of Renewable Energy plants being viewed by Power Stations in an integrated manner.

NPTI feels honoured to introduce such Simulators at Corporate Office, Faridabad and Two training Institutes established at Allapuzha, Kerala and Shivpuri, Madhya Pradesh where extensive simulator study and system operation training can be given now. It is pertinent to mention here that Distribution System Engineers can also be trained by these simulators to understand the Distribution System existing performance and up-gradation of existing system based on knowledge gained. It is expected that all States may move to Smart Systems infrastructure by 2022. Thus, training/exposure gained with Simulator will benefit respective Utilities in terms of planning existing systems with smart devices and improve operational efficiency and reducing the losses/tripping of systems.

NPTI is proud to present the Training Calendar 2020-21 highlighting the various Long-term/Short-term/Simulator training programs in all its Institutes. The Institute has also evolved mechanism to offer customized training programs depending upon the requirements of Power Utilities and Industries based on the special emphasis on the request of the Organisations.

The Training Calendar has also included two on-line training programs being given to the Engineers/Students of IITs, NITs, and Universities to upgrade their skill along with credit transfer and certification. Moreover, any appropriate suggestions which might benefit Power Utilities/Industries in general, can be taken care of depending upon the specific requirements.

I would like to thank all Power Sector Stakeholders and Industries including State Electricity Regulatory Commissions and Central Electricity Regulatory Commission to join hands to meet the massive awareness programs with upcoming new Grid Regulations for Grid Security and Sustainability which is the primary force in re-defining the training components for New India in Mission Mode. I am sure the New PGDC Programs for fresh Engineering Graduates/Utility Professionals and Customised training programs designed for the Power Utilities/Industries etc. will prove to be the best for minimizing the failure, reducing the losses and optimizing the entire assets infrastructure for making India economically fastest growing country on the globe. NPTI will be providing the global training for many more countries in this year.



Prof. (Dr.) Rajendra Kumar Pandey
Director General

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PSO Certification Meeting held at NPTI Faridabad



10th World Renewable Energy Technology Congress, August 21-23, 2019 at New Delhi

1. ABOUT NATIONAL POWER TRAINING INSTITUTE (NPTI)

National Power Training Institute (NPTI), an ISO 9001:2015 & ISO 14001:2015 organization under Ministry of Power, Govt. of India is a National Apex body for Training and Human Resources Development in Power Sector and the world's leading integrated Power Training Institute, with its Corporate Office at Faridabad. NPTI operates on a Pan- India basis through its eleven (11) institutes in different power zones of the country. Apart from highly skilled and competent trainers and state of art laboratories, NPTI has Hi-tech real time simulators which includes, thermal (210 MW, 500 MW), CCGT (430 MW), Hydro (250 MW) and a Despatcher Training Simulator. NPTI has recently acquired a 800 MW Supercritical Simulator and is coming up with six multi-functional Simulators (Thermal: 210 MW, 500 MW, 800 MW, 550 MW CCGT, 250 MW Hydro, SCADA & Smart Grid Operations, RES-Grid Integration, Smart Power Flow Controller Modules in Integrated Framework) at its various branches. Having trained more than 3,20,000 Power Professionals in regular programs over the last 5 decades, NPTI is the only institute of its kind in the world with such a wide geographical spread and covering a wide gamut of academic and training programs in Power Sector.

NPTI operates on an all India basis with man-power strength of 211 including 84 officers through its 11 Institutes in different zones of the country as per detail below:

Northern Region

1. NPTI Corporate Office, Faridabad
2. NPTI (Northern Region) Badarpur, New Delhi
3. NPTI (Hydro Power Training Centre), Nangal

Southern Region

4. NPTI (Power System Training Institute), Bengaluru
5. NPTI (Hot Line Training Centre), Bengaluru
6. NPTI (Southern Region), Neyveli
7. NPTI, Alappuzha

Eastern & North Eastern Region

8. NPTI (Eastern Region), Durgapur
9. NPTI (North Eastern Region), Guwahati

Western Region

10. NPTI (Western Region), Nagpur
11. NPTI, Shivpuri

MAIN OBJECTIVES OF NPTI

The main objectives of the organization are:

- To function as a National Organization for training in the fields of (a) Operation and Maintenance of Power Plants, and (b) All other aspects of Electrical Energy Systems including transmission, sub-transmission and distribution.
- To act as an Apex Body for initiating and coordinating training programs in the Power Sector of the Country.
- To establish and run Training Institutes for Engineers, Operators, Technicians and other personnel of the Power Sector.

SUBSIDIARY OBJECTIVES

- To identify and assess the training needs of the Power Sector in the Country.
- To coordinate the training activities of the various Utilities and those of other technical Institutions and supplement it with the training programmes of its own training Institutes.
- To establish standard norms regarding qualifications and training for personnel of various levels.
- To serve as a National Certification Authority for the purpose of Certification of competence and/or participation to ensure availability of properly trained personnel to man the Electricity Supply Industry.

- To initiate, conduct and coordinate R&D studies in the field of Operation, Maintenance and Management of Power Generation and Transmission System and to prepare and conduct specialized training programmes.
- To establish, maintain and manage laboratories, workshops, experimental transmission lines, sub-station and other facilities required for maintenance of its objectives.
- To collect information and maintain documentation in the field of electricity generation and distribution.
- To collect, prepare, edit, print and publish material, paper, periodicals or reports in furtherance of the objectives of the society.
- To organize Seminars and Workshops.
- To enter into agreements with any enterprise or institution or person and provide funds to them for specific training programmes, demonstrations, assignments, preparation of training material or technical guidance.

TRAINING AT A GLANCE AT NPTI

NPTI conducts long-term, medium-term & short-term Training Programs for Engineers & Supervisors on various technical and managerial topics pertaining to the power sector. The training programs are either NPTI's regular training programs or customized training programs to suit the training needs of the client organizations.

To achieve the objective of providing Energy Sector training, different types of learning situations are created/organized.

- Class room lectures for imparting formal, theoretical and technical knowledge.
- Case studies/Group discussions.
- Self learning techniques, like computer based self learning training packages and e-learning
- Practical hands-on training in corrective maintenance methods and techniques.
- Simulation techniques and on-job training in Power Stations/Power Systems. The training methodology so adopted creates step by step environment for all round development of skill and knowledge of the participants.

Several long-term, medium term and short-term training programs in the areas of Thermal, Hydro, Renewable, Transmission & Distribution, Management, Regulatory Affairs etc. are being conducted in the all Institutes of NPTI. Customized training programs for various Power Utilities are also organized round the year along with Workshops and Seminars on latest developments in the Sector.

NPTI has been catering to the Training Needs of Power Sector Organizations and Process Industries such as Steel, Cement, Aluminum, Fertilizers, Refineries viz., ACC, AECO, APGENCO, BBMB, BHEL, BPCL, BSES, CEA, CESC, CSPTCL, CVPPL, DPL, DTL, DVC, ECIL, FACT, Forum of Regulators, GAIL, GRASIM Industries, HINDALCO, HPGCL, IFFCO, IOCL, IRCON, IREDA, Jindal Power, KPCL, KRIBHCO, MPEB, MPPTCL, NALCO, NEEPCO, NFL, NHPC, NLC, NPC, NTPC, OHPC, ONGC, OPCL, Power Grid, POSOCO, RRVNL, SAIL, SJVN, Sterlite Power Transmission THDC, Toshiba, UPRVNL, and WAPCOS, to name a few.

Industry Interfaced Programs and Placement of Students

NPTI conducts the following industry interfaced programs with the objective to create a pool of committed and competent professionals equipped with appropriate technical skills to steer the Indian Power Sector

- One Year Post Graduate Diploma Course in Power Plant Engineering
- One Year Post Graduate Diploma Course in Renewable Energy and Grid Interface Technologies

- One Year Post Graduate Diploma Course in Smart Grid Technologies
- One Year Post Graduate Diploma Course in Energy Market Management.
- One Year Post Graduate Diploma Course in Power System Operation.
- One Year Post Graduate Diploma Course in Power Management
- One Year Post Graduate Diploma Course in Sub-Transmission & Distribution system.
- Nine Months Post Graduate Diploma Course in Hydro Power Plant Engineering.
- Six Months Post Graduate Diploma Course in Transmission and Distribution System for Engineers.
- One Year Post Diploma Course in Power Plant Engineering
- Six Months Post Diploma Course in Hydro Power Plant Engineering.

Our students of Post Graduate Diploma Courses (PGDC) and Post Diploma Courses (PDC) have been recruited by reputed companies like ABB, ABPS Advisory, Adani Power, APPCPL, Atkins Global, Azure Power, Bajaj Electricals, BSES, Care, CFL, Crisil, Datagen, Deloitte, Easun Reyrolle, Eco Securities, Enercon Capital, Erudite, Enzen Global, Essar Power, ETAC, Feedback Ventures, Gammon India, Genus Power & Infrastructure, GMR, I2S Technologies, IL&FS, Infraline, JK Cement, JP Power, JVS Electronics, Kalkitech, Kalpataru Power Transmission, KEC, KPMG, KSK Energy Ventures, Lahmeyer, Lanco, LNJ Bhilwara, Manav Energy, Manikaran Power, Moser Baer, NDPL, Noida Power, NCC, Oblum Electric, Open System International, PRDC, PTC, PWC, ReNew Power, Samsung, Satyam, Schweitzer Engineering Lab, Secure Meters, Sterlite Power, Suzlon, Tata Power, Teems India Towerlines, TERI, Torrent Power, Toshiba T&D, Vedanta, Vijay Electricals, Wind World India Ltd., etc.

Induction Training

NPTI has imparted induction training to fresh Graduate Engineers/Executives of various Power Sector Organizations as indicated below:

Avantha Power & Infrastructure Ltd., Bokaro Power Supply Corporation Ltd., Chhattisgarh State Power Generation Corporation Ltd., Chhattisgarh State Power Transmission Ltd., CLP (I) Pvt. Ltd., Dakshin Haryana Bijli Vitran Nigam Ltd., GMR Energy Ltd., Ideal Energy Power Ltd., L&T Power Ltd., Lanco Infratech Ltd., Lanco Kondapalli Power Ltd., Lanco Power, Lanco Vidarbha Thermal Power Ltd., National Hydroelectric Power Corporation Ltd., Power Grid Corporation of India Ltd., Power System Operation Corporation Ltd., PPN Power, Generating Company Ltd., Rajasthan Rajya Vidyut Utpadan Nigam Ltd., Reliance Infrastructure, Sterlite Grid Ltd., Tata Power Company Ltd., Torrent Power Ltd., Udupi Power Corporation Ltd., UP Rajya Vidyut Utpadan Nigam Ltd., etc.

On - Job Training

On-job training is an essential supplement to formal training which provides the trainees an understanding of the functions through involvement with real work situations. Special stress is laid on acquisition of required skills for undertaking specific responsibilities in a particular area of work. On-job experience simplifies and consolidates knowledge in a particular sphere for which special type of work books have been designed according to the needs of area where on-job training is conducted.

Online Training Courses

NPTI is conducting online training programs in association with IIT Guwahati, on "E-Mobility and Charging Infrastructure" and "Solar Energy Technology: Fundamentals and Applications". Both are 3 credit courses, with 12 weeks of online training followed by a week of classroom training. Certificates are awarded to the successful candidates at the end of the training.

NPTI is also conducting a blended training program for REMC Operators, in association with GIZ. The training is a blend of 12 weeks online and 1 week classroom training at NPTI. International and national experts have been involved in preparation of the modules and conducting the classroom training.

Training Program for Employees of BSES Rajdhani Power Ltd.

NPTI has conducted "Urja Sarathi", "Uttam Urja Sarathi" "Urja Sarathi 2.0" and TF Engineers Training Programs for the BSES Rajdhani Power Ltd., Delhi. Around 2500 Distribution Linemen were comprehensively trained and certified in the areas of basics of Electricity, Poles, Pole erection, mounting, stringing, clearances, sub-station equipment such as DTs, Circuit Breakers, earthing with their safe operating procedures and accent on Safety. The feedback from BSES is that this training has immensely benefitted the Distribution Linemen with zero number of accident and casualty for last one year.

NPTI Recognized as Cadre Training Institute for Central Power Engineering Services

NPTI is functioning as an Apex Cadre Training Institute for the engineers/officers of Central Power Engineering Services. NPTI is conducting fourth batch of 26 weeks Induction Training Programs for the Asstt. Directors of CEA. 25 ADs have joined in this program. The program includes 20 weeks Technical Training with industry interface and 6 weeks Management Training.

Training Program for Forum of Regulators

National Power Training Institute, Faridabad organizes two days residential training program on "Protection of Consumer Interest" for the ombudsman and officials from the Consumer Grievance Redressal Forums, Regulatory commissions of the various states. This program is conducted every year under the aegis of Forum Of Regulators. The objective of the program is to discuss on various regulations, laws, consumer issues and case studies pertaining to the power sector. Recently NPTI Faridabad conducted the program during 30-31 January 2020.

Capacity Building Training Program

NPTI is conducting 4 weeks "Technician Development Program" for the Capacity Building of DISCOMs of NER States. 6 States are participating in this training program.

Simulator Training

The Institutes of NPTI are well equipped with Hi-Tech infrastructural facilities for conducting different courses on technical as well as management subjects covering the needs of Thermal, Hydro, Transmission & Distribution Systems, and Energy related fields of the Indian Power and allied Energy sectors.

NPTI has a 500 MW Thermal Power Plant Training Simulator, 430 MW (2 x 143 MW Gas Turbine and 1 x 144 MW Steam Turbine), Full Scope Combined Cycle Gas Turbine at Faridabad Institute and 210 MW Thermal Power Plant Training Simulator at Nagpur and Badarpur Institutes for imparting specialized skills to Thermal Power Plant Operation personnel across the country. A High fidelity Load Dispatch Operator Simulator for the National Grid installed at PSTI, Bengaluru. A 250 MW Hydro Simulator installed at HPTC, Nangal.

New 800 MW Supercritical Thermal Power Plant Simulator has been commissioned at NPTI Corporate Office, Faridabad.

Six (6) DCS based Multi-functional configured simulators are being commissioned at NPTI Corporate Office, Faridabad, Bengaluru, Nagpur, Durgapur, Alapuzha and Shivpuri.

Power System Operation Training and Certification

NPTI has been conducting Certification of Power System Operators since 2011. Training Courses at NPTI, Corporate Office, Faridabad, Power System Training Institute (PSTI),

Bengaluru and NPTI NER, Guwahati equip with the System operators with necessary inputs to take up the various System Operation Certification Examinations.

Basic level on-line System Operator Certification

A total of 1195 System Operators were certified against 1500 who appeared for the Basic Level Certification Examinations.

Specialist level courses on 'Regulatory Framework in Power Sector', 'Power System Reliability', 'Renewable Energy Sources and Grid Integration', 'Power System Logistics' and 'Power Market Specialist' are being conducted both at Corporate Office, Faridabad and at PSTI, Bengaluru.

Specialist Level Online System Operator Certification

In "Regulatory Framework in Power Sector" 254 System Operators appeared for the certification examination out of which 161 qualified.

In "Power System Reliability" 203 System Operators appeared out of which 154 were qualified.

In "Power System Logistics" 44 System Operators appeared out of which 23 were qualified.

TRAINING PROGRAMS OF NATIONAL IMPORTANCE

Skill Development Training

NPTI has been empanelled as a Government agency with Ministry of Rural Development (MoRD) for conducting NSQF aligned training program on all India basis for Power Sector & Renewable Energy Sector vide notification no. 5/2019, dated: 26.02.2019 and the MoU has been signed with MoRD on 04.04.2019.

Vide Gazette notification No. 449, F. 43001/02/2013-NSDA, dated 05.12.2019 of Ministry of Skill Development and Entrepreneurship & 23rd meeting of NSQC held on 22.08.2019, NPTI has been recognised as an Assessment & Certification body for 60 Qualifications in Power Sector and Renewable Energy Sector.

ATAL Faculty Development Program

NPTI is conducting AICTE Training & Learning (ATAL) Academy faculty development program in the areas of recent technological advancement across India through its eleven (11) institutes.

INTERNATIONAL TRAINING

Professionals from various countries like Afghanistan, Bangladesh, Belarus, Bhutan, Cambodia, Ecuador, Ethiopia, Iraq, Kenya, Libya, Malaysia, Mexico, Myanmar, Nepal, Nigeria, Oman, Papua New Guinea, Philippines, South America, Sri Lanka, Sudan, Syria, UAE, Zambia, Zimbabwe etc. have also undergone training at NPTI's various training Institutes.

ITEC Programme, Ministry of External Affairs, Govt. of India

NPTI is conducting training programs through ITEC, MEA, Govt. of India for the countries of the world i.e. SAARC, African Countries etc.

INFRASTRUCTURAL FACILITIES AT NPTI

The Institutes offer world class infrastructural facilities like, excellent simulators, relevant laboratories and workshops, computer labs with state of the art PCs, well stocked libraries with national and international journals and reference materials, fully air-conditioned classrooms, conference halls and board rooms with video conferencing facility, modern classrooms equipped with latest teaching aids, wi-fi enabled campus, residential students and executive hostels, auditorium, gymnasiums and playgrounds.

SIMULATORS

500 MW Simulator

NPTI has a high-quality, high-fidelity real-time full scope 500 MW Fossil Fuel Fired Power Plant Training Simulator, at its Corporate Centre. The Simulator realistically emulates the behavior of the entire process simulation in a real-time scenario for a meaningful and off-job Operator Training. This is a replica of the 500 MW Stage-III, Unit-5 of Chandrapur Thermal Power Station of MAHAGENCO and has a unique facility of imparting training on the 'Conventional Control Panels' as well as on the 'Video Process Control' (DDC/CRT-Key Board based Unit Operation) Panels in Virtual Panel and Control Schematic modes of Unit Operation, taking care of the needs of futuristic trends in Power Plant Operation. The Simulator training results in Operators making better judgment calls, reduced plant trips, trouble free start-ups and maneuvering of plant sub-systems, optimum usage of auxiliary resources, extended equipment life, less down time and lower costs. The Simulator has more than 250 emergency conditions, including DAS functions for applications ranging from Operator Training to engineering and plant performance analysis and improvements etc.



Combined Cycle Gas Turbine Simulator

NPTI has set up a high-quality, high-fidelity real-time 430 MW Combined Cycle Gas Turbine Power Plant Simulator, at its Corporate Centre. The Simulator realistically emulates the behavior of the entire process simulation in a real-time scenario for a meaningful and off-job Operator Training. This is a replica of NTPC Faridabad Gas Power Plant, Siemens Make V-94.2 Model comprising of 2x143 MW Gas Turbines and 1x144 MW Steam Turbine. This CCGT replica Simulator is equipped with all the CRT controls with Latest State-of-the art Barco Screens. The training on this simulator will benefit operators and Shift Charge Engineers working or being posted on Combined Cycle Gas Plants.

210 MW Thermal Power Plant Simulators

Regional institutes at Badarpur and Nagpur are equipped with 210 MW Fossil Fuel fired thermal power plant full scope real time Simulators. The Simulator at Badarpur is a replica of 210 MW Unit of Badarpur Thermal Power Station, New Delhi and the one at Nagpur replicates 210 MW unit of Khaperkheda T.P.S. of MAHAGENCO. These Simulators provide a unique opportunity for the trainees to experience a full range of operation and stress situations in an integrated mode of Unit Operation.

These state-of-the-art Simulator facilities improve the reflex operational skills of Shift Charge Engineers, Unit Controllers, Operators and fresh engineers being inducted into Operation and fine-tune their skills in operational emergencies together with tremendous integrated Unit experience, exposure and understanding of normal operations viz., Cold, Warm & Hot Start up processes as well.

800 MW Supercritical Thermal Power Plant Simulator

NPTI has set up a Full Scope 800 MW Supercritical Coal Fired Power Plant Training Simulator at its Corporate Centre, Faridabad. This simulator is replica of NTPC's unit #1 of Kudgi Project (3X800 MW) and is fully modular. The simulator consists of a set of operator stations with all operator functions, instructor's station for instructor tasks, multiple virtual controllers to simulate the exact controls of the reference plant, a simulator programming station and HMI stations. The operator interfaces are virtual, identical to those in

the plant interfaced with the models in order to provide the complete look and feel of the plant. The fidelity of the process models provides a realistic response to operator actions whether during normal, upset or emergency operating conditions. The training of plant operators under the variety of conditions provides the required mindset for efficient operation of the plant, which includes developing domain expertise, decision making attitude and maximum availability of the plant in grid connected mode.



DCS based Multifunctional Configured Simulator

NPTI is in the process of commissioning six more DCS based multifunctional simulators at NPTI Corporate Office Faridabad and its branches at Bengaluru, Nagpur, Durgapur, Alappuzha and Shivpuri. While the simulators at Bengaluru, Nagpur and Durgapur shall have the 210 MW, 500 MW and 800 MW Thermal Power Plant configuration, the simulators at Alappuzha and Shivpuri shall be configured with the 210 MW, 500 MW and 800 MW Thermal Power Plant, 250 MW Hydro, SCADA & Smart Grid functionalities. The multifunctional simulator at NPTI Corporate Office shall be configured with 210 MW, 500 MW Thermal Power Plant, 250 MW Hydro, Combined Cycle Power Plant, SCADA & Smart Grid functionalities. Hands on training on the simulator would give a perfect understanding of integrated operation of the power plant & power system.



Dispatcher Training Simulator (DTS)

The DTS at PSTI Bengaluru is a digital computer based high-fidelity Power System Simulator in which a representative system of National Grid is simulated. It has options for all types of generation like Hydro, Thermal, Nuclear, Gas, Pumped Storage System and for Transmission schemes covering 220 KV & above and also for the various generation voltages. The transmission equipment like Transformers, Transmission lines, Capacitor banks, Bus Line Reactors, SVCs, CBs, isolators etc. are all suitably represented in the simulator. The real-time simulation is carried out for normal and emergency conditions of the network with initial conditions. The behaviour of various Power System elements for different loading conditions can be studied in the Simulator. Time tagged or manual events can be introduced on-line into the Simulator during exercises. Protection schemes could be implemented with the help of voltage relays, frequency relays, rate of change of frequency relays, over current relays etc. Thus the actual system occurrences can be simulated and saved as save cases. Hence, it is a comprehensive training tool for training of Power System and Load Dispatch Engineers and Operators.



Hydro Simulator, Nangal

NPTI has installed a state of the art real time full scope 250 MW hydro simulator replica of Unit-1 of Nathpa Jhakri Hydro Power Plant at HPTC Nangal. The Simulator has the facility to operate from the conventional panel as well as from the VPC mode of operation.

GIS Resource Centre

A Geographical Information System (GIS) Resource Centre has been set up at NPTI Corporate Office, Faridabad. The Centre is conducting various courses in GIS and Remote Sensing to meet the requirements of the Power Sector.

Hot Line Training Centre

A facility has been created at NPTI's Hot Line Training Centre (HLTC), Bengaluru for Live Line Maintenance of Transmission Lines upto 400 KV (first of its kind in Asia) which enables the trained personnel to attend the maintenance requirements without power interruptions. Facility for water washing of sub-station equipments is also available.



Laboratories/Workshops

The laboratories and Workshops are the prerequisites for providing on-job, hands-on training in the maintenance aspects. The institutes have well equipped laboratories and workshops with wide ranging facilities for imparting training to all cadres including Technicians, Operators and Engineers, in various aspects of Power Generation, Transmission Distribution and Operation. Some of the areas where expertise has been built up are:

- Control and Instrumentation Laboratories with facilities for testing, calibration and repairs of different types of process control instruments.
- Maintenance workshops for Valves, Bearings & Shaft alignment, Pumps, Motors etc.
- Electrical laboratories with facilities for testing of relays, electrical equipments, insulating oils etc., along with repairs as per requirement.
- Power System Studies Laboratories are equipped with Transmission and Distribution System Software where studies such as load flow analysis, short circuit studies, transient stability studies, relay coordination studies, optimal capacitor placement, network reduction and optimal separation point can be conducted.



Models

All the Institutes under NPTI have good number of Static and Dynamic models relating to various main systems and equipments of Thermal Power Stations, Hydro Power Stations and Power Systems. Models for demonstration in the diversified areas of training in NPTI are also available.

NPTI Publications and Multi Media CBT Packages

NPTI has published around 99 Training Manuals for different courses. NPTI has also developed more than 55 Multimedia Computer Based Training Packages for power professionals.

Library

NPTI Corporate Centre library has a large collection of books and video packages on power generation, transmission and distribution technologies, various branches of engineering, science, industrial relations, management etc. It subscribes to a number of Indian and foreign technical journals and periodicals.

All regional institutes have modern libraries stocking a large collection of books and multimedia films on Power Station Technology, Mechanical Engineering, Electrical Engineering, Power Plant, Chemistry, Control and Instrumentation, Electronics, Computers, Management etc. These libraries also subscribe to a variety of Indian and foreign periodicals and journals for keeping in tune with the latest developments in Engineering & Technology.

Auditorium, Conference Hall, Residential Quarters

All Institutes of NPTI are situated in picturesque landscapes. They have auditorium/ conference hall and classrooms with most modern



amenities for conducting the training programs, conferences, seminars and workshops. All the campuses are housed with residential quarters for the employees, guest house, hostels, sports facilities, gymnasium and canteen. The campuses and hostels are Wi-Fi enabled and provide a hygienic and homely atmosphere to the trainees.

Hostel Facilities

Residential Services are available for Regular Trainees, Executives and Foreign National in all the Institutes. Well furnished hostels for Executive and Trainees with modern lodging and boarding facilities are available in all Institutes.

NPTI Corporate Office, Faridabad can accommodate about 550 trainees. An international hostel with 24 double bedded rooms is the latest addition to the Corporate Office Campus.





Well furnished hostels are also available at each of the regional institute of NPTI where modern and hygienic lodging and boarding facilities are available. Those desirous of availing the hostel facilities will have to intimate in advance to the Principal Director/HOI and obtain confirmation for the same. In case a participant does not stay in the hostel, he has to make his own arrangements to reach the Institute. Recreation and indoor sports facilities like Table Tennis, Badminton, Carom, Chess etc. are available for trainees in Hostel, creating a congenial atmosphere of a Home away from Home.

The hostel accommodation is provided to the trainees only for the period of training course.

Classrooms

All the institutes have modern classrooms equipped with latest teaching aids including computer compatible projection systems and audio visual aids, required for efficient running of training programs. Video conferencing facility is available in all the institutes.

Medical Services

Services of well qualified doctors are available on part-time basis in each of the Institute Complex.

Faculty Members

NPTI's faculty consists of highly qualified, award winning, scholarly and experienced men and women who are leaders in their respective fields. Our faculty members come from across the country, sharing their perspective, wealth of knowledge, experience,

qualification and expertise with students and working Professionals. Faculty members at NPTI have successfully developed numerous industry responsive courses to ensure trainees bring out the best in them and excel in their careers. Details of the faculty members are available on NPTI's website www.npti.gov.in.

HOW TO APPLY FOR PARTICIPATION

NPTI and its Institutes work five days a week (Monday to Friday), working hours being 09:30 to 18:00 hrs. The changes in program schedule, if any, are duly intimated. NPTI regularly organizes Training programs/ Seminars/ Workshops in collaboration with National/ International Power Sector Organizations, details of which are prominently displayed on the website.

Nomination along with course fee for various courses may be sent to The Principal Director/ Director of the respective institute at least 15 days in advance from the date of commencement of the course. Aspiring students for PGDC courses may visit the website, and keep abreast with announcements of the various programs and may apply as per the instructions therein. The information and brochures of different workshops, seminars and conferences being conducted at NPTI are also available on the website. Application/ Registration to the workshops/ seminars/ conferences may be done as mentioned in the respective brochures.

CONSULTANCY SERVICES

In order to serve the industry requirements and make best usage of infrastructure and expertise, NPTI has ventured into providing consultancy services in a number of relevant areas of Energy Sector.



Renewable Energy Integration Program at NPTI Alappuzha

2. VISION, MISSION, VALUES AND DETAILED FRAMEWORK - VISION 2025

Vision

To be the Global Centre of Excellence for Training and Skill Development in Power & Energy Sectors.

Mission

Enhancing human and organizational excellence in Power and Energy sectors by blending frontier clean energy technologies to achieve economy and energy security.

Value

We value our drive and commitment to provide cutting edge technologies and top service to our clients, sharing our knowledge and caring for their needs.

Attitude

We constantly strive to motivate every power professional to tap his unique human endowments, consciousness, imagination and willpower. Together we make a difference.

Detailed Framework – Vision 2025

NPTI proposes to conduct Skill development Programs in all areas of Renewable Energy Sources, Smart Grid, Smart Village development, Decentralized Generation & Distribution, Programs on Regulatory Framework & Commercial Aspects, Demand Side Management & Energy Efficiency, Power Markets etc. to achieve the Ministry of Power's target of training Seven (7) lakhs Manpower in the Skill development and other associated programs.

- Solar PV, Solar Roof Top, Solar Building Integrated (SBIPV) PV, Solar Thermal Technologies including Project Planning, Execution & Certification comprehensively including Resource assessment, Site selection, Shadow analysis, Load Calculation and Analysis, Procedures, permission & approvals, module mounting structures, Inverters, Cables, DC & AC Junction boxes, Lightning Arresters, Surge Protection, Fault Analysis, Earthing, O&M, Inspection, Testing & Commissioning, DPR preparations, Financial Modelling, commercial and financial aspects etc.
- Introduction to Wind Energy technology, Government policies and supportive schemes, Wind Resource Assessment Techniques, Wind flow modeling, Wind data analysis, Overview of Wind Turbine Design & Foundations, Grid integration, O&M aspects of wind farms
- Introduction to biomass to energy – biofuels, Present status of biomass based energy in India, Biomass Resources, Technologies, Basics of Gasification and types of Gasifiers, Sizing/Selection of Gasifiers, Technology and process overview, Successful Project Examples, Issues and challenges
- Conducting Training Programs on Hydropower Generation Plants with upcoming Renewable Energy Mix: Design, Operation, Economic Evaluation, Energy Market with Bidding Mechanism in Open Access & Prevailing Rules and upcoming Regulations in Legal Framework
- Develop smart villages by developing Solar parks in villages, which would not only generate revenue but also develop self-reliant economies including industries at village level bringing urban amenities to rural areas retaining the soul of the village.
- Conducting Training Programs for strengthening Urban Centers infrastructure.
- Decentralized Distributed Generation (DDG) and Micro-grid smart projects (solar, mini & micro hydel etc.) in remote areas & villages to not only make them self-sufficient but also promote the concept of Green Energy etc. and increase local employability as well.
- All Renewable Energy Modules to be equipped with integrated smart grid control to avoid least excursions at the point of connectivity.
- Bringing about complete awareness to personnel in the power sector about MoP initiatives such as DDUGJY, IPDS, UDAY, 24x7 Power to All Schemes etc.
- Programs on DSM & Energy Efficiency may be regularly announced and conducted for maximum awareness. Retailer programs for awareness in energy efficient equipments and Energy Conservation techniques for street lighting including automated switching on-off LEDs, Energy Efficient agriculture pump sets etc. in association with BEE / EESL.
- Awareness Programs on Climate change, carbon credits & Global Warming issues.
- Courses on "Regulatory Framework & Commercial Aspects" of Indian Power Sector aggressively through distance learning mode educating all Utilities personnel at their doorstep through e-learning Modules & Assignments for greater understanding of Regulatory & Commercial concepts like Tariff calculations, MYT Framework, Trading etc. thereby improving the pace & effectiveness of Power sector reforms at large.
- The addition of 175 GW of renewable generation capacity by 2022 would require improving the System Operators skill-sets for planning, operating, maintaining and governing the power systems. NPTI would conduct Capacity building Programs for POSOCO - SLDCs, RLDCs and others associated to manage green energy corridors effectively. Also, all associated functions of Renewable Energy Management Centres (REMC) such as forecasting, Scheduling, balancing Renewable Energy resources and supporting the national grid etc.
- Programs on Power Market Transactions focusing on the Concept of Power Trading, Power Exchange mechanism in India, Availability Based Tariff & Concept of Deviation Settlement Mechanism, Open Access in Power Sector etc.
- The 24x7 Power for All, scheme of the Govt. of India would need intensive capsule courses for capacity building of personnel in the areas of Generation, Transmission & Distribution including various commercial aspects. This is to be taken up with all the State Utilities which have signed MoU with Ministry of Power under UDAY.

- NPTI has been empanelled with MoRD Vide Notification No. 5/2019 dated 26-02-2019 and Signed an MoU with MoRD for conducting Skill Development Training Program in various areas of Renewable Energy and Power Sector. To carry on the mission of Skill development training activities under NSQF Framework with MoRD and certifying personnel for their appropriate employment in various areas of power sector.
- NPTI has started Training Program/Certification of outsourced personnel for the Utilities of Distribution/Transmission/Generation/RE in various states such as Orissa, West Bengal and many more states are going to join.
- Conducting Training Programs for State Distribution Utilities on Smart Meters, AMI and associated infrastructure, Peak Load Management, Demand response and Outage Management System.
- Programs on Smart Grid highlighting the Concept, Understanding of Intelligent Power System, Achievements & Challenges. The Program would also focus on the need of Smart Grid in Indian context.
- The recent significant progress between the South Asian countries on moving towards expanded regional energy cooperation should be exploited to harness programs and NPTI proposes to conduct programs under USAID and for the SAARC countries in several areas of power sector as well as for others.
- Creating academic-industry interface short modular programs to effectively bridge the education- industry gaps for students passing out from Engineering, Diploma & ITI institutes.
- Delivering course modules & training in Supercritical technology to all GENCOs using this technology.
- Identify Knowledge Partners for Creating a Global Pool of competent experts in various areas of specializations to maximize connectivity and contribute to the concept of "Train in India".
- Collaborating with reputed Institutions & Industries like IIT/IIM/ASCI/TERI/Nord Pool to be abreast of latest technological & managerial improvements of the industry.
- Create an authenticated institute-industry feedback interactive portal.
- Developing subject specialists in various areas and increasing internal Core Competence of NPTI through Training of Trainers programs.



Two Days International Conference on Electrical and Electronics Engineering from 28th -29th February, 2020 at NPTI Faridabad



Two Days National Workshop on 'Evaluation & Upgradation of Existing HVAC and HVDC Corridor for Large Renewable Energy Evacuation' at NPTI Bengaluru

3. COLLABORATIONS / MoU

With an aim to enhance the culture of collaborative work and resource sharing in the National interest, NPTI is actively engaged in establishing collaborations by entering into MoU's with leaders in industry and academia. Various activities such as conducting joint R&D, organizing seminars, workshops, conferences etc. are being carried out.

1. NPTI signed an MoU with National Institute of Solar Energy (NISE) to cooperate, accelerate, expand and achieve necessary competencies in Renewable Energy Technologies.
2. NPTI signed an MoA with IEEMA in the presence of Hon'ble Power Minister on 30.09.2016 at Mumbai for employment linked skilling programs which includes youth in the villages.
3. NPTI also entered into an MoU with PTC Financial Services for employment linked skilling programs for youth in villages
4. NPTI has entered into an MoU with Power Research & Development Consultants Pvt. Ltd.
5. NPTI signed an MoU with EESL & BEE for skill training to personnel involved in O&M of LED Street Lighting and Retailer Training programs for awareness in Energy efficient equipments respectively
6. NPTI has entered into an MOU with IIT Guwahati.
7. NPTI has entered into an MOU with Mindteck India Pvt. Ltd.
8. NPTI has entered into an MOU with XED Executive Development Pvt. Ltd.
9. NPTI has entered into an MOU with National Institute of Wind Energy.
10. NPTI has signed an MOU with MoRD for conducting Skill Development Programs under DDU-GKY Scheme in all states and UT's.
11. NPTI has entered into an MOU with Aligarh Muslim University.
12. NPTI has entered into an MOU with MNIT, Jaipur.
13. NPTI has entered into an MOU with Non Ferrous Materials Technology Development Centre (NFTDC)
14. NPTI has entered into an MOU with Abu Dhabi Water & Electricity Authority (ADWEA)
15. NPTI has entered into an MOU with JNTU, Anantpur.
16. NPTI has entered into an MOU with Assam Power Distribution Company for IPDS scheme .
17. NPTI has entered into an MOU with Assam Science & Technological University, Govt. of Assam.
18. Collaborations of NPTI with Govt. of Odisha for Training support on Electrical Safety.
19. NPTI has entered into an MoU with National Institute of Technology, Hamirpur to work together in an integrated and collaborative manner in relation to Electric Power Sector including Renewable Energy Sector.
20. NPTI has entered into an MoU with Galgotias University to work together in an integrated and collaborative manner in relation to Power Sector.



Memorandum of Understanding signing Between NPTI and NIWE at NPTI Bengaluru



Memorandum of Understanding signing Between NPTI and NIT Hamirpur on 7th September 2019



Dr. P. Mahanta, Director NIT, Arunachal Pradesh visited the Institute and signed MOU with NPTI NER



Memorandum of Understanding (MoU) between National Power Training Institute (NPTI) & Jawaharlal Nehru Technological University Anantapur.

4. TRAINING COURSES

(A) Simulator Training Programs

4.1 SIMULATOR PROGRAMS

4.1.1 210 MW Fossil Fuel Power Plant Simulator Training

Objective

To train fresh engineers on a full scope replica simulator in all aspects of operation as well as for developing suitable response to malfunctions and emergency situations by Hands-on-Practice in all the phase of operation from start-up to shut-down.

Program Profile

- Cold start, up to 100% load.
- Partial load to full load and back to partial load.
- Manoeuvring of different auxiliaries.
- Hot start/warm start to full load.
- Planned shut down.
- Over-rides and alarms during different exercises.
- A few malfunctions.

Venue : Nagpur

Duration : 02 Weeks

Date :	13-04-2020	27-04-2020	11-05-2020
	01-06-2020	15-06-2020	06-07-2020
	20-07-2020	03-08-2020	17-08-2020
	31-08-2020	14-09-2020	28-09-2020
	12-10-2020	13-11-2020	07-12-2020
	21-12-2020	04-01-2021	18-01-2021
	01-02-2021	15-02-2021	01-03-2021
	15-03-2021		

Who may attend: Shift Charge Engineers/ Operation Engineers/ Desk Controllers engaged in operation of Thermal Power Station and also fresh graduate engineers who had undergone training in O&M of power station/ posted in Thermal Power Stations.

4.1.2 500 MW Fossil Fuel Power Plant Simulator Training

Objective

To train engineers on full scope replica simulator of 500 MW thermal power station, in all aspects of operation and helping them to make better judgement calls/responses to malfunctions and emergent situations by imparting them hands on practice in:

- Full Scope/Conventional Panel Operation Mode.
- CRT –Keyboard Based Operation Mode.

Program profile

- Cold start and up to 100% load.
- Partial to full load and back.
- Hot start / Warm start to full load.
- Planned Shutdown.
- Maneuvering of different auxiliaries.
- Operation under emergency conditions.

Venue : Faridabad

Duration : 02 Weeks

Date :	13-04-2020	04-05-2020	18-05-2020
	01-06-2020	15-06-2020	06-07-2020
	20-07-2020	03-08-2020	17-08-2020
	27-09-2020	21-09-2020	05-10-2020
	26-10-2020	09-11-2020	07-12-2020
	21-12-2020	04-01-2021	18-01-2021
	01-02-2021	15-02-2021	01-03-2021
	15-03-2021		

Who may attend : Shift charge Engineers/ Operation Engineers/ Desk controllers working in Thermal Power Station and also fresh Engineers posted in Thermal power stations.

4.1.3 Combined Cycle Gas Turbine Power Plant Simulator Training

Objective

To train engineers on full scope replica simulator of 2x143+1x44 MW CCGT power station, in all aspects of operation and helping them to make better judgement calls/ responses to malfunctions and emergent situations by imparting them hands on practice.

Program Profile

- Cold start and up to 100% load.
- Partial to full load and back.
- Hot start / Warm start to full load.
- Planned Shutdown.
- Manoeuvring of different auxiliaries.
- Stand aline Operation of Gas Turbine.
- Operation under emergency conditions.
- Operation of Gas turbine in open Cycle mode.

Venue : Faridabad

Duration : 02 Weeks

Date :	13-04-2020	04-05-2020	18-05-2020
	01-06-2020	15-06-2020	06-07-2020
	20-07-2020	03-08-2020	17-08-2020
	07-09-2020	21-09-2020	05-10-2020
	26-10-2020	09-11-2020	07-12-2020
	21-12-2020	04-01-2021	18-01-2021
	01-02-2021	15-02-2021	01-03-2021
	15-03-2021		

Who may attend: Shift charge Engineers/ Operation Engineers/ Desk controllers working in Combined Cycle Gas Turbine Power Station and also fresh Engineers posted in Combined Cycle Gas Turbine Power Station.

4.1.4 250 MW Hydro Simulator Training

Objective

To train the engineers on a full scope replica simulator in all aspects of operation as well as for developing suitable response to malfunctions and emergency situations by Hands-on –Practice in all the phase of operation from start-up to shut-down.

Program Profile

- Start-up of Machine & load upto 100%.
- Partial load to full load and back to partial load.
- Maneuvering of different auxiliaries.
- Planned shutdown.
- Operation under emergency.
- Over-rides and alarms during different exercises.
- Few malfunctions & its trends.

Venue : HPTC, Nangal

Duration : 01 Week

Date :	20-04-2020	11-05-2020	01-06-2020
	15-06-2020	06-07-2020	20-07-2020
	17-08-2020	24-08-2020	07-09-2020
	21-09-2020	05-10-2020	26-10-2020
	09-11-2020	07-12-2020	04-01-2021
	01-02-2021	22-02-2021	01-03-2021

Who may attend: Shift charge Engineers/Operation Engineers/ Desk controllers engaged in operation of Hydro power station & also fresh graduates engineers who had undergone training in O&M of Hydro power station / posted in Hydro power stations.

4.1.5 Dispatcher Training Simulator

Objective

To practice the Normal and emergency Operation of Power System, Active and Reactive Power Control and Advanced Applications using Dispatcher Training Simulator (DTS).

Program Profile

- Dispatcher Training Simulator Overview.
- Active and Reactive Power Control.
- Indian National Network including HVDC Lines.
- Prime mover dynamics. (Hydro, Steam, Gas and Pumped storage units)
- Load shedding schemes.
- Islanding schemes.
- SCADA Operation.
- Automatic Generation Control.
- Islanding and Integrated Operation.
- System Occurrence and Restoration.
- System Stability.
- Voltage Control and Voltage Collapse Simulation.
- Prevention of Grid Disturbance.

Venue : PSTI, Bengaluru

Duration : 02 Weeks

Date : 20-04-2020

Who may attend: Persons involved in System Operation and Control i.e. Generating Station, Transmission, Load Dispatch Centre, Sub-Station and Distribution Personnel.

4.1.6 800 MW/660 MW (emulated) Super Critical Thermal Power Plant Training Simulator

Objective

To train engineers on full scope replica simulator of 800 MW, Super critical coal fired power station in all aspects of operation and helping them to make better judgement calls/responses to malfunctions and emergent situations by imparting them hands on practice.

Program Profile

- Cold start up to 100% load Hot start/warm start up to full load.
- Planned shut down.
- Auto/manual control of parameters.
- Operation under emergency conditions.

Methodology

Lectures, Video session, Hands on and Demo Session on Simulator and Case Studies.

Venue : Faridabad

Date :	20-04-2020	11-05-2020	08-06-2020
	29-06-2020	27-07-2020	17-08-2020
	14-09-2020	12-10-2020	02-11-2020
	23-11-2020	21-12-2020	18-01-2021
	08-02-2021	01-03-2021	

Venue : Durgapur

Date :	11-05-2020	29-06-2020	10-08-2020
	21-09-2020	16-11-2020	03-01-2021
	15-02-2021		

Duration : 02 Weeks

4.1.7 Multifunctional Simulators

- (a) Thermal - 210 MW/ 500MW/800MW
- (b) Hydro - 250 MW
- (c) CCPP - 550 MW
- (d) SCADA & Smart Grid

The training on the multifunctional configured simulators may be on only the Thermal Power Plants (210/ 500/ 800 MW) or an integration of Thermal (210/ 500/ 800 MW), Hydro (250 MW), SCADA and Smart Grid or even a integration of Thermal (210/ 500/ 800 MW), CCPP (430/ 550 MW), Hydro (250 MW), SCADA and Smart Grid Hands on training on either of the combinations would give a perfect understanding of integrated operation of the power plant & power system.

Program Profile

- Start up to Synchronization and Synchronization to Full load and Back.
- Planned shut down.
- Maneuvering of different auxiliaries.
- Operation under emergency conditions.

Venue **Date**

Faridabad

Bengaluru

Nagpur (210MW/500MW/800MW Simulator Training)

	13-04-2020	27-04-2020	11-05-2020
	01-06-2020	15-06-2020	06-07-2020
	20-07-2020	03-08-2020	13-08-2020
	17-08-2020	14-09-2020	28-09-2020
	12-10-2020	23-11-2020	07-12-2020
	21-12-2020	04-01-2021	18-01-2021
	01-02-2021	15-02-2021	01-03-2021
	15-03-2021		

Nangal (250MW)	20-04-2020	11-05-2020	01-06-2020
	15-06-2020	06-07-2020	20-07-2020
	17-08-2020	24-08-2020	07-09-2020
	21-09-2020	05-10-2020	26-10-2020
	09-11-2020	07-12-2020	04-01-2021
	01-02-2021	22-02-2021	01-03-2021
Durgapur(210MW)	13-04-2020	01-06-2020	13-07-2020
	24-08-2020	05-10-2020	01-12-2020
	17-01-2021	01-03-2021	

Durgapur(500MW)	27-04-2020	15-06-2020	27-07-2020
	07-09-2020	02-11-2020	21-12-2020
	01-02-2021	14-03-2021	

Alappuzha Dates will be fixed on Mutual Agreement with the Organisation.

Shivpuri

Duration : 02 Weeks

Methodology : Lectures, Video session, Hands on and Demo Session on Simulator and Case Studies.



26 Weeks Training program on O&M of Thermal Power Plant for the participants of UPL at NPTI Badarpur

(B) TRAINING COURSES - INDUSTRY INTERFACED TRAINING COURSES AND LONG TERM COURSES (17 WEEKS AND ABOVE)

4.2 ACADEMIC PGDC/PDC PROGRAMS FOR ENGINEERING/DIPLOMA GRADUATES STUDENTS/WORKING PROFESSIONALS

The admission to the following one year Post Graduate Diploma Courses (PGDC) is done through a Common Entrance Test (CET) held on all India Basis:

- Power Plant Engineering.
- Renewable Energy and Grid Interface Technologies.
- Smart Grid Technologies.
- Energy Market Management.
- Power System Operation.

Admission notification is published in the national newspapers and NPTI's website, www.npti.gov.in. Aspiring students are encouraged to visit the website for all information about the courses. The prospectus covers all details like the CET date, the eligibility criteria, the counseling date and the date of commencement of the courses. Aspiring students can visit NPTI's website for the prospectus.

4.2.1 Post Graduate Diploma Course (PGDC) in Power Plant Engineering

Objective

To prepare the fresh Graduate Engineers to become Power Station Managers in Operation and Maintenance of Thermal Power Stations.

Program Profile

Module No.	Description	Duration (weeks)
1	Power Plant Familiarization & Industrial Safety.	5
2	CCGT, Co-Generation & Hybrid Systems.	2
3	Power Plant Briefing & Scheme Tracing work.	3
4	Power Plant Operation.	2
5	Power Plant Performance & Efficiency. Calculation.	1
6	Nuclear Power Plants.	1
7	Advanced Steam Generation Technology - Supercritical & FBC.	1
OJ-1	Rotational On-Job (Operation).	3
9	Chemistry, Metallurgy, NDT & Welding.	1
10	Renewable Energy (RE) resources, Conventional & RE Systems.	1
11	Solar PV & Thermal Technologies.	3
12	Business Communication & Personality Development.	1
<i>First Semester Examination</i>		1
13	Power Sector Reforms and Regulations.	1
14	Wind Energy and Hydro.	2
15	Bio Mass, Bio Energy and Waste to Energy.	2
16	Energy Storage Technologies.	1
17	Power Plant Protection.	2
18	Maintenance Planning Inspection & Cost Control.	2
19	Control & Instrumentation.	2
20	IT Application in Power Sector & GIS.	1
21	Load Dispatch.	1
22	Renewable Energy Grid Interface Technologies.	1
23	Erection, Commissioning & Construction Management.	2
24	Energy Audit & Project Management.	1
25	Environment Management.	1
OJ-2	Rotational On-Job. (Maintenance)	4
26	Simulator Training, Visit to Manufacturers Works.	3
<i>Second Semester Exam</i>		1
Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.		
Total		52 Weeks

Venue	Date
Faridabad	26-08-2020
Badarpur	26-08-2020
Nangal	26-08-2020
Neyveli	26-08-2020
Durgapur	26-08-2020
Guwahati	26-08-2020
Nagpur	26-08-2020
Alappuzha	26-08-2020
Shivpuri	26-08-2020
Duration :	52 Weeks
Who may attend : B.Tech. / B.E. or its equivalent with minimum 60% marks in Mechanical/Electrical/Electronics/ C&I/ Power Engineering and related branches.	

4.2.2 Post Graduate Diploma Course (PGDC) in Renewable Energy and Grid Interface Technologies

Objective

Focus of this course is to equip the students with technologies, economics and policy involving energy systems and supply with Renewable Energy sources. Detailed expertise will be offered in Solar Energy Systems involving photovoltaic as well as thermal Energy Systems, Wind Energy, Biomass, Geothermal, Tidal and Wave Energy, Hydrogen & Fuel Cells, Small Hydro along with problems associated with grid integration issues of various sources, problems and interfacing technologies and concept of Smart Grid.

Program Profile

Module No.	Description
1	Energy Resources and Conventional Energy Systems.
2	Applied Heat and Power Technology.
3	Legislative and Regulatory Framework.
4	Managerial and Interpersonal Skills.
5	Energy Economics.
6	Communication Skills and Technical Writing.
7	Solar Thermal Systems.
8	Solar Photo-Voltaic Systems.
9	Grid Interface Technologies - I.
10	Tariff and Commercial Aspects.
11	Contracts Management.
12	On Job Training / Visits to Solar Thermal/ Solar PV and other RE sites and Lab Work.
13	Wind Energy and Small Hydro.
14	Bio Mass& Bio Energy and Waste to Energy.
15	Hydrogen and Fuel Cells.
16	Geo-thermal, Tidal and Wave Energy.
17	Co-Generation & Hybrid Systems.
18	Energy Storage Technologies.
19	Appraisal & Financing of Renewable Energy Projects.
20	Energy, Environment and Sustainable Development.
21	Grid Interface Technologies – II.
22	Smart Power Flow Controllers and Intelligent Automation.
23	On - Job Training/ Visits to RLDC/SCADA facility.
24	Project Presentation.
Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.	
Total 52 Weeks	
Venue	Date
Faridabad	03-08-2020
Durgapur	03-08-2020
Nagpur	10-08-2020
PSTI Bengaluru	03-08-2020
Alappuzha	03-08-2020
Shivpuri	03-08-2020

Duration : 52 Weeks

Who may attend: B.Tech. / B.E. or its equivalent with minimum 60% marks in Electrical / Electrical & Electronics / Electronics & Communication / C&I/ Computer Science/ Information & Communication Technology/ Information Technology and related branches.

4.2.3 Post Graduate Diploma Course (PGDC) in Smart Grid Technologies

Objective

The objective of the course is to explain in detail the Smart Grid Technologies, their applications covering Smart Generation, Smart Transmission and Smart Distribution. The candidates shall develop their skills to operate Smart Grids integrating Renewables, E-Vehicles, Storage Systems, Smart Meters and to get jobs in these areas.

Program Profile

Module No.	Description
1	Evolution of the Indian Power Sector.
2	Legislative & Regulatory Framework.
3	Managerial & Interpersonal Skills.
4	Communication Skills and Technical Writing.
5	Smart Grid Policy and Regulations.
6	Introduction to Traditional Power Systems.
7	Introduction to Smart Grids.
8	Smart Grid Control Elements & Internet of Things.
9	Smart Distribution technologies.
10	Energy storage, micro-grids, alternative grid designs.
11	Demand Side Management & Demand Response.
12	Integration of Renewable Energy into the Grid - I.
13	Transmission and Distribution Challenges in Smart Grids.
14	On-Job Training / Visits/ Simulator.
15	Communications and Interoperability.
16	Load Forecasting.
17	Energy Management Systems.
18	Smart Grid Operations.
19	Smart Grid Controls & Smart Power Flow controllers and Intelligent Automation.
20	Smart Grid Applications Layer.
21	Cyber Security.
22	Integration of Legacy Systems.
23	E-mobility.
24	Integration of RE Sources - II.
25	Smart Grid as enablers for Smart Cities.
26	International Benchmarks and Lessons learnt.
27	Smart Grid Maturity Models
28	Pilot Projects/ Case Studies and Business Models for Smart Grids.
29	Visits/ Lab./Simulation.
30	Project Presentation.

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.

Total 52 Weeks		
Venue	Duration	Date
Faridabad	1 year	03-08-2020 05-02-2021
Durgapur	1 year	03-08-2020 05-02-2021
Nagpur	1 year	10-08-2020 01-02-2021
PSTI Bengaluru	1 year	03-08-2020 05-02-2021
Alappuzha	1 year	03-08-2020 05-02-2021
Shivpuri	1 year	03-08-2020 05-02-2021

Who may attend : B.Tech. / B.E. or its equivalent with minimum 60% marks in Electrical /Electrical & Electronics /Electronics & Communication / C&I/ Computer Science/ Information & Communication Technology/ Information Technology and related branches.

4.2.4 Post Graduate Diploma Course (PGDC) in Energy Market Management

Objective

The course focuses on the market structures that exist within the electric energy industry. It includes mechanism of energy markets;

comparative market systems; determination of prices under different market structures; electricity market architecture; electricity market design; dispatch and new build decisions; risk and risk management; current and proposed policies on the energy industry etc. This course provides the flexibility to an engineer for managing power utilities with insight into Energy Market Management.

Program Profile

Module No.	Description
1	Energy Resources and Electricity Generation Options.
2	Transmission Networks.
3	Power System Operation and Management.
4	Electricity Industry Structure and Regulations.
5	Overview of Economic Theory.
6	Commercial Systems & Transmission Pricing.
7	Electricity Markets Design.
8	Managerial and Interpersonal Skills.
9	Communication Skills and Technical Writing.
10	Visits to IEX/PXIL/RLDC.
11	Load Dispatch Simulator Training.
12	Investing in Generation and Transmission.
13	Ancillary Services Markets.
14	Operation of Market Oriented Power Systems.
15	Electricity Storage Technology and Management.
16	Managing Risk.
17	Integration of Renewables and Effect on Power Markets.
18	Introduction to Smart Grids.
19	Power System Optimisation.
20	Smart Power Flow Controllers and Intelligent Automation.
21	Cyber Security in Power Systems.
22	Climate Change and the impact on Energy Systems.
23	Power Market Simulation Lab.
24	Project Presentation.

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.

Total 52 Weeks		
Venue	Duration	Date
Faridabad	1 year	03-08-2020
Durgapur	1 year	03-08-2020
Nagpur	1 year	10-08-2020
PSTI Bengaluru	1 year	03-08-2020
Alappuzha	1 year	03-08-2020
Shivpuri	1 year	03-08-2020

Who may attend: B.Tech. / B.E. or its equivalent with minimum 60% marks in Electrical /Electrical & Electronics / Electronics & Communication/ C&I/ Computer Science/ Information & Communication Technology/ Information Technology/ Mechanical/ Power Engineering and related branches.

4.2.5 Post Graduate Diploma Course (PGDC) in Power System Operation

Objective

The objective of the course is to provide in depth knowledge of electric power system generation, operation and control. The emphasis is on power system operation and operating mechanism/ tools.

Program Profile

Module No.	Description
1	Evolution of Indian Power Systems.
2	Legislative and Regulatory Framework.
3	Managerial and Interpersonal Skills.
4	Communication Skills and Technical Writing.
5	Elements of Power System.
6	Principles of Power System Operation.
7	Power System Stability and Control - I.
8	Reactive Power Management.
9	Power System Analysis.

10	On Job Training and Site Visits to Transmission Substation/ O&M of Substation/Switchyard/NLDC/ HVDC/FACTS facility.
11	On Job Training on Load Dispatch Simulator and Power. Systems Lab /HV Lab.
12	Legislative and Regulatory Framework - II.
13	Commercial Aspects and Contracts Management.
14	Transmission Pricing.
15	Power System Stability and Control - II.
16	Power Systems Planning and New Technologies.
17	System Security and Reliability.
18	Smart Power Flow Controllers and Intelligent Automation.
19	Power Markets.
20	Ancillary Services Management.
21	SCADA / EMS and IT & Telecommunication Systems.
22	Protection Systems.
23	System Operation in emergency.
24	Power System Restoration
25	Optimization Techniques and MATLAB.
26	Power Markets Simulation Lab.
27	Training & visit to RLDC/SCADA facility.
28	Project Presentation.

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.

Total 52 Weeks		
Venue	Duration	Date
Faridabad	1 year	03-08-2020
Durgapur	1 year	03-08-2020
Nagpur	1 year	10-08-2020
PSTI Bengaluru	1 year	03-08-2020
Alappuzha	1 year	03-08-2020
Shivpuri	1 year	03-08-2020

Who may attend : B.Tech. / B.E. or its equivalent with minimum 60% marks in Electrical/Electrical & Electronics/ C&I/ Power Engineering and related branches.

4.2.6 Post Graduate Diploma Course (PGDC) in Sub-Transmission and Distribution Systems

Objective

The main objective of the course is to create technically trained manpower readily available for recruitment by the power companies and electrical service divisions of large industries in the area of Transmission & Distribution of Electrical Power.

Program Profile

Module No.	Description
1	General Introduction, Power Sector scenario.
2	Fundamentals of Electricity, Power Quality, Harmonics & Mitigation.
3	Generation Systems – Thermal, Hydro, Nuclear, CCGT, Diesel Power Plant.
4	RES - Site selection, RE System Sizing, Feasibility reports.
5	Power Electronics Controls, Rectifier, Inverter, Power Control Unit.
6	Solar Photo Voltaic (SPV) Systems.
7	Sub T & D Planning, Optimization, Design & Engineering.
8	Engineering of Transmission and Distribution Sub-stations.
9	HT & LT Switchgears, Battery, Battery Chargers & DCDB, UPS & UPS Batteries.
10	Metering.
11	Power Cables, LT Cables.
12	Engineering of Transmission and Distribution Lines.

13	Inspection of Electrical Installations and IE Safety Regulations.
14	Protective Relays
15	Sub Transmission and Distribution System Protection.
16	Power System Operation.
17	Flexible AC Transmission Systems.
18	Grid Integration of Distributed Generation.
19	Energy Storage, Scheduling and Dispatch.
20	Distribution Automation, SCADA, EMS, PMU and Wide Area Monitoring.
21	Smart Grids.
22	Project Management of T&D Systems.
23	Reliability issues.
24	O&M of T&D Systems.
25	O&M of REPS, Converters, Battery and Control Panel.
26	Service Connections, H R Aspects & CRM.
27	Energy Efficiency and Energy Audit.
28	Demand Side Management.
29	Best Practices in Transmission & Distribution Loss Reduction.
30	Power System Planning, Optimization, Design & Engineering.
31	Power System Protection.
32	General Principles of Live Line Maintenance Techniques (LLMT).
33	Demo of LLMT on 11 kV and 33 kV systems.

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.

Total 52 Weeks		
Venue	Duration	Date
PSTI Bengaluru	1 year	05-08-2020

Who may attend : B.Tech. / B.E. or its equivalent with minimum 60% marks in Mechanical/ Electrical/Electrical & Electronics / Power Engineering and related branches.

4.2.7 Post Graduate Diploma Course (PGDC) in Hydro Power Plant Engineering

Objective

To prepare engineers to become Power Station Managers in Operation and Maintenance of Hydro Power Stations. This 39 week duration course covers all aspects of Hydro Power Plant engineering viz creation, O&M, commissioning etc. The Course authorizes the engineer to operate and maintain Hydro Power Plants.

Program Profile

Module No.	Description	Duration (Weeks)
1	General Introduction of Hydro Power Plant Engineering.	2
2	Power plant familiarization of Hydro Power Plant Engineering.	3
3	Planning & cost control.	1
4	Safety & First aid.	1
5	Construction activity of a Hydro Power Plants.	2
6	Electro mechanical equipment using in Hydro Power Plants.	3
7	Hydro mechanical equipment Testing Erection & Commissioning.	1
8	Welding and Ndt.	1
9	Control & Instrumentation.	2
10	Computer application in Hydro Power plant.	1
11	Power Plant Protections.	2
12	Switchyard Equipments.	1
13	Power Plant Operation .	2
14	Load Dispatch.	1
15	Maintenance of Hydro Power Plant Equipments.	1
16	Inspection of Hydro Power Plant Equipments.	1
17	Hydro Power Plant Simulator.	1
18	Introduction to Management.	1
19	Plant Operational Training at Hydro Power Plant (On-JOB).	6
20	Plant maintenance Training at Hydro Power Plant (ON-JOB).	5
21	Final Assessment & Evaluation.	1

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; shall be considered as a special project/internship as part of curriculum.

Total		39 Weeks
Venue	Duration	Date
Nangal	39 Weeks	07-09-2020

Who may attend : B.E./B. Tech. or equivalent in Mechanical/ Electrical/Electrical & Electronics/Power Engg.

4.2.8 Post Graduate Diploma Course (PGDC) in Transmission & Distribution System

Objective

The main objective of the course is to create technically trained manpower readily available for recruitment to the power companies in the area of Transmission & Distribution of electrical power.

Program Profile

Module No.	Description	Duration (Weeks)
1	General Introduction Power Scenario & General Introduction.	1
2	Power Generation Thermal Power Plant Familiarization.	1
3	Power Transmission Lines Engineering and O&M.	2
4	Live Line Maintenance Technique.	1
5	Substation Planning & engineering	1
6	Substation Operation & Maintenance.	1
7	Load Despatch & Grid Management.	2
8	Communications in Power Systems.	1
9	Power Distribution /Distribution Lines/Cables.	1
10	Systems Engineering O&M.	2
11	Distribution Sub-Stations.	1
12	Distribution Metering.	1
13	Energy Audit and Conservation in Distribution Systems.	1
14	Information Technology applications in T&D.	1
15	Power System Planning Studies.	1
16	Safety, Statutory Safety & Statutory regulations.	1
17	Commercial aspects Commercial aspects in T&D Systems.	1
18	Management of Electrical Contract .	1
19	New Technologies Power System Protection.	1
20	High Voltage Testing Power System Equipment.	1
21	HVDC Transmission System.	1
22	Simulator Training/Lab Simulator Training, Relay Testing.	1
23	Appraisal.	1

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.

Total		26 Weeks
Venue	Duration	Date
Badarpur	6 months	13-07-2020 04-01-2021
PSTI Bengaluru	6 months	05-08-2020 01-04-2020
HLTC Bengaluru	6 months	
Guwahati	6 months	
Nagpur	6 months	03-08-2020 22-02-2021
Alappuzha	6 months	03-08-2020
Shivpuri	6 months	02-11-2020 22-02-2021

Who may attend : B.E./B. Tech. or equivalent in Electrical/ Electrical & Electronics/Power Engg.

4.2.9 Post Graduate Diploma Course (PGDC) in Power Management

Objective

The recent past has witness phenomenal expansion in the power Sector, both in public and private sectors, necessitating positioning of matching trained manpower. However, the supply of professionally trained manpower has been a constraint. Although, there has been mushrooming of Engineering and Management Institutes and a number of fresh Graduates are available in the

market, the industry needs trained professionals with sufficient experience to straightaway take charge of job in hand. This course is designed to meet this challenge and to create a pool of technically trained manpower readily available for recruitment in the Sector.

Program Profile

Module No.	Description	Duration (Weeks)
CORE MANAGEMENT		
1	Management Concepts & Applications.	
2	Managerial Economics.	
3	Organizational Behavior.	
4	Quatitative Analysis.	
5	Accounting for Managers.	
6	Business Communication Skill.	
7	Business environment.	
8	Financial Management.	
9	Marketing Management.	
10	Human Resource Management.	
11	Operations & Supply Chain Management.	
12	Business Research Methods.	
13	Operations Research.	
14	Strategic Management.	
15	Management Information System.	
16	Business Legislation.	
17	Entrepreneurship.	
18	E-Commerce.	
POWER MANAGEMENT		
19	Energy Resources and Coverations and Power Plant System.	
20	Electricity Industry Structure and regulations.	
21	Management of Power Transmission and Distribution	
22	Power Environment Interface.	
23	Power Pricing and Power Purchase Agreement.	
24	Integrated Energy Market Management and Power Planning.	
OPTIONAL		
25	Project Management and Infrastructure Finance.	
26	Management of Financial Institutions and Service.	
27	Strategies Cost Management and Control.	
28	Organizational Change and Development.	
29	Performance Management.	
30	Security Analysis and Portfolio Management.	
31	Financial Derivatives.	
32	Taxation Laws and Planning.	
33	Talent Management.	
34	Renewable Energy.	
35	Global Power Business.	
36	Rural Energy Development.	
Total		52 Weeks
Venue	Duration	Date
Faridabad	52 Weeks	24-08-2020

Who may attend : B.Tech/B.E. or its equivalent with minimum 60% marks in Electrical/ Electrical & Electronics/ Power Engineering and related branches.

4.2.10 Post Diploma Course (PDC) in Power Plant Engineering

Objective

To give the Operators/Supervisors the knowledge and skill of overall operation and maintenance of thermal Power Plants along with specific background in Distribution Engineering.

Program Profile

Module No.	Description	Duration (Weeks)
1	General Introduction and Orientation.	1
2	Environment & Personal Safety.	8
3	Power Plant Description.	6
4	Power Plant Scheme Description and Tracing.	2
5	Power Plant Operation (Supervisory).	2
6	Power Plant Chemistry.	1
7	Power Plant Instrumentation.	1
8	Power Plant Efficiency Performance.	1
9	Basic Welding Practice & NDT.	1
10	Maintenance Planning Inspection and Cost Control.	6

11	Power Plant O&M (On-Job).	10
12	Introduction to Management.	1
13	Computer Application.	1
14	Power System Operation and Electrical Protection.	1
15	Power Distribution Engineering and Systems.	3
16	Distribution Metering and Techniques of Loss Minimisation.	3
17	Simulator.	2
18	Protection.	1
19	Final Appraisal.	1
Total		52 Weeks

Venue	Duration	Date
Badarpur	1 year	14-09-2020
Neyveli	1 year	25-11-2020
Durgapur	1 year	01-09-2020 August 2021
Guwahati	1 year	
Nagpur	1 year	
PSTI Bengaluru	1 year	
Shivpuri	1 year	01-04-2020

Who may attend : Diploma or equivalent in Mechanical/Electrical/Electrical & Electronics Engg.

4.2.11 Post Diploma Course (PDC) in Hydro Power Plant Engineering

Objective

To prepare Engineers to become Power Station Managers in Operation and Maintenance of Hydro Power Station

Program Profile

Module No.	Description	Duration (Weeks)
1	General Introduction & Orientation	0.5
2	Concept of Hydro Power Stations, Site Section, Component and Layout	1.5
3	Hydro Mechanical Equipments	1
4	Hydro Turbines	1
5	Hydro Generator & Excitation	1
6	Transformers	1
7	Switchyard & GIS	1
8	Working Principles, Characteristics & Operation of Auxiliary System	1
9	Hydro Lab. Practical	1
10	Control & Instrumentation	1
11	C & I Lab. Practical	1
12	Electrical Lab. Practical	1
13	Protection & Interlocks	1

14	Power Plant Operation	1
15	Erection, Testing and Commissioning	1
16	Load Dispatch & SCADA	1
17	Power Plant Safety & Acts	1
18	On Job Training	2
19	Mechanical Maintenance	1
20	On Job Training in Mechanical Maintenance	1
21	Electrical Maintenance	1
22	On Job Training in Electrical Maintenance	1
23	Hydro Power Plant Simulator	1
24	Final Evaluation & Project Assessment	2
Total		26 Weeks

Venue	Duration	Date
Nangal	26 Weeks	10-08-2020

Who may attend : Diploma or equivalent in Mechanical/Electrical/Electrical & Electronics Engg.

4.2.12 Post Diploma Course (PDC) in Distribution & Substation Management

Objective

The main objective of the course is to create technically trained manpower readily available for recruitment to the power companies in the area of Transmission & Distribution of electrical power.

Venue	Duration	Date
Badarpur	6 months	Mutually Agreed
Durgapur	6 months	Mutually Agreed
PSTI Bengaluru	6 months	Mutually Agreed

Who may attend : Diploma or equivalent in Mechanical/Electrical/Electrical & Electronics Engg.

4.2.13 Post Diploma Course (PDC) in Transmission Line Maintenance

Objective

To provide in depth approach and technical knowledge in Live Line Maintenance Techniques.

Venue	Duration	Date
HLTC Bengaluru	6 months	Mutually Agreed

Who may attend : Diploma or equivalent in Mechanical/Electrical/Electrical & Electronics Engg.

Note: Online courses shall be considered as a part of curriculum.

- (i) Solar Energy Technology : Fundamentals & Applications;
- (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.



Certificate Distribution to the participants at NPTI Alappuzha



Simulator Testing at NPTI Durgapur



Participants visiting to Gas Insulated Substation

LONG TERM COURSES

4.2.14 Graduate Engineers Course (Power Plant Engineering)

Objective

To train the fresh Graduate Engineers in all aspects of Power Plants and prepare them for recruitment by PSUs/SEBs/ Power Utilities.

Program Profile

Module No.	Description	Duration (Weeks)
1	Introduction.	
2	Power Plant Description.	5
3	Power Plant Scheme Tracing & System Discussion.	2
4	Power Plant Operation.	3
OJ-1	Power Plant Operation (Manual).	4
OJ-2	Power Plant Operation (Supervisory).	4
5	Performance (Formal).	1
6	Safety.	1
7	Plant training. (Practicals)	5
8	Planning & Cost Control.	1
OJ-3	Maintenance. (Supervisory)	8
OJ-4	Performance. (On-job)	1
9	Chemistry.	1
10	Basic Welding.	0.5
11	Non-Destructive Testing.	0.5
12	Protection.	1
13	Introduction to Management.	2
14	Simulator Training.	2
15	Metallurgy.	1
16	Computer Applications.	1
17	Load Dispatch.	1
18	Control & Instrumentation.	2
19	Maintenance & Inspection.	4
20	Appraisal & Valedictory.	1

Note: Online courses (i) Solar Energy Technology : Fundamentals & Applications; (ii) e-mobility and charging infrastructure shall be considered as a special project/internship as part of curriculum.

Total	52 Weeks	
Venue	Duration	Date
Badarpur	1 year	
Neyveli	1 year	26-02-2021
Guwahati		
Nagpur	1 year	31-08-2020 15-02-2021
Shivpuri	1 year	27-04-2020

Who may attend : B.E./B. Tech. or equivalent in Mechanical/ Electrical/Electrical & Electronics/Power Engg.

4.2.15 Certificate Course on “Regulatory Framework & Commercial Aspects” of Indian Power Sector

Objective

Develop an understanding of regulatory & Policy Framework of the Indian Power Sector.

Program Profile

Module No.	Description
1	Overview of Indian Power Sector & Phase-wise Sectoral Reforms, Global Regulatory Frameworks in Power Sector.
2	Electricity Act 2003, Electricity Amendment bill 2014 & Policy Guide lines.
3	Regulatory Institutions in Indian Power Sector & their Functioning.
4	Tariff determination methodology Tariff based bidding for Thermal Projects.
5	Power market Transactions.
6	Challenges & Way Forward.

Venue	Duration	Date
Faridabad	6 months	Mutually Agreed

Who may attend : Power Sector Professionals through online admission.



Malaviya Jayanti Celebration 2019

(C) TRAINING COURSES - MEDIUM TERM COURSES (5 - 16 WEEKS)

4.3 MEDIUM TERM COURSES

4.3.1 3 Months Course on “Design, Erection and Commissioning of Solar Power Plants

Objective

The Program has been designed to help the participants learn the basics of Design, Erection and Commissioning, of Solar Power Plants through lectures, experiments and Lab sessions. All concepts related to Technology, Design and Planning of Solar Power Plants along with balance of plants shall be explained. Financial and Economic aspects shall also be covered.

Program Profile

- Module 1: (1 week)
General: Global Energy Scenario, Indian Energy Scenario, Energy Policy.
- Module 2: (1 week)
Solar Radiation: Physics of Solar radiation, Global Beam and diffuse radiation.
Related Lab experiments.
- Module 3: (2 weeks)
Fundamentals of Solar Cell: Solar PV basics, Solar PV Module, Solar Cell technologies, Crystalline cell, solar photovoltaic modules, Concentrators and PV Modules.
Related lab experiments.
Field Visits/Manufacturer's works.
- Module 4: (1 week)
Balance of Solar PV Systems: Battery technology, Batteries for PV systems, DC –DC converters, Charge Controllers, DC–AC inverters, Single phase, three phase, MPPT.
- Module 5: (1 week)
Photovoltaic Power System : PV system configuration, Standalone system with DC / AC load without battery and with battery, Hybrid system, Grid connected systems, Plant Visits.
- Module 6: (1 week)
Planning & Design : Planning Procedure, System capacity and Energy Demand, Site selection, System concept, Module selection and PV Generator, Selection and sizing of cables, Standalone System; Battery sizing, Charge Controller and Inverter, Grid Connected Systems; Selection and inverter sizing, Generator Junction Box and DC Main Switch, Safety Measures, Grid Interface, Mounting System, tender specification, Standards and certification.
- Module 7: (1 week)
Aspects of Owner's Engineering of Solar Power Projects : Pre-feasibility study, Feasibility study, Detailed project report, Design basis report, Technical specification, Packaging of the contracts, Preparing of RFP, Review engineering, Detailed engineering, Construction monitoring, Commissioning of the projects, Aspects of technical due diligence, Detailed due diligence report, Construction monitoring PG test and handover practices, O&M approach and feasibility, EPC Contracts, Suppliers and Manufacturers, warranty, guarantee, Liquidity damages, Project Cost Adequacy, Integration of contracts (Sub contracts).
- Module 8: (1 week)
Installation and Commissioning: Mounting System Cables, Earthing, Junction Box, Commissioning Related lab experiments.
- Module 9: (1 week)
Grid integration : Control techniques and RE integration systems (AC/DC Drives Control, Predictive direct power control of system connected into the grid, Technological aspects, Active network devices, Controls, Micro Grid), Power Grid Analysis and Studies (Electrical System Modeling, Power supply quality, Optimization and Grid Planning).
- Module 10: (1 week)
Instrumentation & Measurements, Economical and Financial Analysis : SCADA system, sensors, data logger, Monitoring, data management, Analysis and performance, Financial Analysis, Life Cycle Costing, Environmental Analysis and Social Costs, Case Study.

Project Work

All participants are required to submit a Project Report.

Venue	Duration	Date
Alapuzzaha	3 months	18-05-2020
Shivpuri	3 months	27-04-2020

Who may attend : Diploma and Graduate Engineers.

4.3.2 3 Months Course on ‘Distribution Substation Management & Optimal Utilization of Components’

Objective

The Program has been designed to help the participants learn the basics of Distribution Systems, Substation Layouts, Design, Erection and Commissioning, through lectures, experiments and Lab sessions. Financial and Economic aspects shall also be covered.

- Module 1: (1 Week)
Introduction to Power Plants & Power Scenario: Power scenario and growth of power industry in India, Organisation / Power Sector set up in India, Distribution reform in India, Transmission and Distribution of Electricity in India, Role of Private Participants in Transmission and Distribution, Introduction to Thermal Power Plant, Introduction to Hydro Power Station, Introduction to Gas Power Plant, Introduction to Nuclear Power Plant, Non - Conventional energy sources overview.
- Module 2: (1 Week)
Fundamentals of Electricity, Power Quality & Harmonics: Active and Reactive Power, fundamentals of load compensation, Balanced System and Unbalanced Fundamentals of load compensation, practical aspects of compensator used as voltage regulator, Conventional methods to regulate voltage, dynamic voltage restorer: principal for operation, mathematical description, Transient operation of DVR, realization of DVR voltage using voltage source inverter, maximum compensation capacity of the DVR.
- Module 3: (1 Week)
Planning & Engineering Design of Distribution Substation: Load forecasting, Philosophy of distribution planning, Acquaintance with software for distribution planning and optimization, Distribution substation types, layouts, bus bar arrangements, Civil engineering requirements, Bay design, Selection of Distribution substation Transformers, circuit breakers, etc, General rules for Electrical Installation design: Rules and statutory regulations, Installed power loads – Characteristics, Power loading of an installation, Procedure for the establishment of a new substation - Preliminary investigation, Project studies, Implementation and Commissioning, Distribution analysis, design and equipment sizing, Single feed, dual feed and dual transformer substations, Design of lighting for Sub Stations, SWYD, Control room & Switchgear Rooms, Design and Engineering of Gas Insulated Substation, Overview of Geographical information systems and Remote Sensing, Global positioning system & applications and Surveying techniques.
- Module 4: (1 Week)
Erection & Commissioning of Distribution Sub-Stations: Erection of Distribution Transformers/ Sub-Stations/ Earthing stations/ GIS, Code of Practice of Sub-Station operators, Instrument Transformers/ CTs and PTs, Technical Visit to 220 /66/33 kV Sub-Station.
- Module 5: (1 Week)
HT & LT Switchgears, & Batteries: Types of switchgears and Selection of switchgear, Features of circuit breaker, types of quenching medium used in circuit breakers, Air Circuit Breaker, Vacuum Circuit Breaker & SF6 Circuit Breaker, MCB, MCCB, ACDB, PDB Soft Starters, DOL Starters, VFD & VVFD drives starters, Types of Batteries, Selection and sizing, sizing of Battery Chargers for Sub Stations, UPS system, sizing of UPS Batteries Selection, Sizing and performance of circuit breakers, Testing of circuit breakers, Maintenance of Switchgear. Technical Visit to Switchgear factory.

- Module 6: (1 Week)
Cables & Metering: Types of metering, viz. DT metering, feeder metering and consumer metering: setting and operation, testing and sealing, Design and construction of distribution meters, Indian electricity rules of metering; detection of theft/tempering, unauthorized loads, investigation, legal aspects, anti-theft measures and case studies, Familiarity with hardware (CMRI) and software for meter data download, analysis and detection of meter tampering, Tariff: Types, method of fixing, penalty clauses, etc, Power Cable Design, Construction, Testing, Operation & Maintenance, LT and HT Cable jointing, Termination and Accessories, Cable fault detection and repair, Demo on Power cable jointing- End joint & Straight through joint.
- Module 7: (1 Week)
Distribution Lines & PLC: Survey, Route alignment, GPS application, Line Components, Bill of Quantities, Types of Poles, foundation, Design and selection aspects of tower/pole structures, conductors insulators and other hardware, Conductors, Insulators, Bushings, Erection of Distribution structures, Line Stringing, Sagging, Line construction, Line Reconfiguration, Compact Lines, Aerial Bunched Cable systems, PLC elements, Memory – RAM, ROM, EPROM, I/O Point address, Digital, Analog input output signals, A/D, D/A conversion protection against signal noise, Programming of PLCs, Digging holes and pole erection, Fixing of different fittings on poles such as cross arms, insulators, stay wires etc. Stringing and sagging overhead line conductors, Jointing overhead line conductors, Installation of overhead service lines.
- Module 8: (1 Week)
Protective Relays, Grounding & IE Safety Regulations: Relays – Types, construction, characteristics and location in substation, IR rules, safety Regulations, Design of Earthing MAT, Fire Safety and demo.
- Module 9: (1 week)
Distribution System Protection: Steady State Fault Analysis (SSFA) & Tutorial on Fault Analysis, Voltage calculation at fault locations, Overvoltage protection, Principles of lightning protection, Design of the electrical installation protection system, Fault interrupting devices and non-fault interrupting devices.
- Module 10: (1 week)
Distribution Automation, Distributed Generation & Integration: Customer Site Automation functions: Load control, Remote meter reading, Time-of-use rates, Feeder reconfiguration & Transformer balancing, voltage/VAR control using: Capacitors, Regulators, and LTC, Distribution system monitoring, Digital protection of substations and feeders, SCADA and Equipment for Feeder Automation & Customer Automation, Distributed Generation (DG) - Overview and technology trends; DG planning, cost implications of power quality, Cost of energy and net present value calculations and implications on power converter design, Import/export metering, net metering, generation based incentives, accelerated depreciation, Grid connected RES systems & Power quality issues, Power quality implication, acceptable ranges of voltage and frequency, flicker, reactive power compensation, and active filtering and low voltage ride through requirements, Familiarisation with distribution software packages and latest software tools and use thereof for billing and revenue realisation, GIS mapping and consumer indexing.
- Module 11: (1 week)
Simulator Training at PSTI, Bengaluru, RT lab/ HV lab/ DTS lab.
- Module 12: (1 week)
Rural Electrification & Smart Grids: Outsourcing of distribution activities, appointment of franchisees and self load management by villagers and Gram Panchayats, Maintenance of complaint centres and fault removal etc. by village Panchayats etc, Separation of rural and urban supply system, Rajiv Gandhi Grameen Vidyutikaran Yojana, Technical Visit to Distribution Substation/LDC, Outsourcing of distribution activities, appointment of franchisees and self load management by villagers and Gram Panchayats, Maintenance of complaint centres and fault removal etc. by village Panchayats etc., Smart Grid – Basic overview – Evaluation of Smart Grid road map in India, on-going Smart Grid activities in India, Smart Grid – Basic overview – Evaluation of Smart Grid road map in India, on-going Smart Grid activities in India, Smart Grid Distribution network and initiative, Policy and Regulation – Requirement of Smart Grid.

Venue	Duration	Date
Alapuzhaha	3 months	08-06-2020
Shivpuri	3 months	Mutually Agreed
Who may attend : Diploma and Graduate Engineers		

4.3.3 Live Line Maintenance Techniques (LLMT), Using Hot Stick Method (HSM)

Learning the Hot Stick Method of training is a basic necessity to execute works Live on Transmission Lines & Switchyard. The course covers the overall features of Hot Line Techniques including awareness about Hot Line Washing, Insulator testing, Switchyard Maintenance, etc. It is intended to enhance the competence level of the participants to handle the maintenance both on transmission lines and Switchyard using Hot Stick Methods. The training programme offers direct benefit to the organizations involved in maintenance of transmission lines/Switchyards by reducing the number and duration of shutdowns as well.

Objective

- To Provide in-depth approach and technical know-how in live line maintenance.
- To highlight the importance of maintenance of HV and EHV Power Transmission lines using Hot Stick Method.
- To give an introduction to Bare Hand Method of Live Line Maintenance.

Program Profile

- General Principles of LLMT.
- Introduction to maintenance of Power lines using Hot Stick Method.
- Practical oriented Operation covering various tower configurations.
- Safety aspects and Regulatory requirements.
- Study Tours to Certain Important substations and transmission line locations.
- Hands on training on commercial lines of various configurations up to 220 kv.
- Field testing of insulators - use of analogue and digital methods, demo on the use of Punctured Insulators - use of analogue and digital methods, demo on the use of Punctured Insulator Detector (PID) test kit.
- Introduction to maintenance using Bare Hand Method of Live Line Maintenance and switchyard maintenance using LLMT.

Venue	Duration	Date
HLTC Bengaluru	11 Weeks	01-06-2020 24-08-2019 21-12-2020

Who may attend : Foreman, Lineman, Asst. Linemen, Supervisors, Junior Engineers, Asst. Engineers, etc. actively involved in Line Maintenance activities having physical fitness. It is preferred that one of the nominees from Executive cadre.

4.3.4 Live Line Maintenance Techniques (LLMT) using Bare Hand Method (BHM) on 400KV Lines

The fast growing HT/EHT/UHT Transmission lines and the rapid addition of 400 KV lines in the country, has made it imperative to upgrade the Live Line Maintenance Technology. The training program offers direct benefit to the organizations involved in maintenance of transmission lines by reducing the number and duration of shutdown. learning the Bare Hand Techniques in essential in order to exploit the full potential of LLMT and it can increase the scope of Maintenance activities.

Objective

- To provide in-depth approach and technical know-how in Live Line Maintenance Techniques.
- To highlight the importance of Operation and Maintenance of HV and EHV Power Transmission Lines using Bare Hand Techniques.

Program Profile

- Brief revision on LLMT using HSM.
- Introduction to maintenance of Power Lines using Bare Hand Techniques.
- Additional Safety aspects and requirements.
- Practical Oriented Operation Covering various tower configurations.
- Hands-on training on 400 kV commercial lines of various configurations.

- Field training on testing of Insulators.
- Introduction to switchyard maintenance using LLMT.
- Study Tours to certain important substations and transmission line locations, if time permits. Major time will be devoted to impart training in the field on 400 kV transmission lines as well as on commercial lines of POWERGRID Corporation of India dealing with practical aspects.

Venue	Duration	Date
HLTC Bengaluru	05 Weeks	09-11-2020

Who may attend : Foreman, Linemen, Asst. Linemen, Supervisors Junior Engineers, Asst Engineers etc. actively involved in Line Maintenance activities having physical fitness. It is preferred that one of the nominee be in the rank of Executive cadre. The candidates should have already been trained in Live Line Maintenance Techniques using Hot Stick Method.

4.3.5 Post Graduate Certificate Course (PGCC) in Power Plant Engineering

Objective

Post Graduate Certificate Course in Thermal Power Plant Engineering for the candidate willing to make a career in the Power Industry. This course is designed for fresh and practicing Graduate Engineers.

Program Profile

- General Introduction: Concept of Modern Thermal Power Plant, Location /Site Selection, Plant layout & Power Plant Safety.
- Constructional details and basic principles of large pulverized fuel Boiler and auxiliaries.
- Construction and working principles of Turbine and auxiliaries.
- Various types of Valves and Pumps.
- Construction and working principles of Alternators and Excitation Systems, Transformers, Motors, Switchgears, Power Supply System and Switchyard.
- Tariff Calculation.
- Tariff Based Bidding, Concept of UMPPs.
- Fuel Handling Plant, Ash Handling System and Cooling Water System.
- Water Sources and treatment.
- Operation, control and supervision of Boiler, Turbine and Alternator.
- Instrumentation & Control (including DAS & DDC) and Protection system.
- Power Plant Maintenance practices.
- Scheme Tracing/ Plant Visits.
- Simulator Training.

Venue	Duration	Date
Faridabad	12 Weeks	Mutually Agreed

Who may attend : B.Tech., B.E. (Mech.), Electrical, Electronics, C&I and Power Engineering.

4.3.6 Post Graduate Certificate Course (PGCC) in GIS & Remote Sensing

Objective

Awareness on different GIS & RS software and their applications in different sectors.

Program Profile

This program will help in acquiring good knowledge and skill on GIS & Remote Sensing by providing the best comprehensive knowledge to professionals & technical officers from the government and private sector organizations. This emphasize the importance and need of GIS & its application in power industry and other sectors.

Module No.	Description
1	Concept of Remote Sensing:- Elements of Remote Sensing, Satellite Remote Sensing & Sensors.
2	Fundamentals of GIS- Basics of Geography & Cartography, Map Projections.
3	GIS Data Preparation & Analysis.
4	DIP using ERDAS Images - Image Interpretation & Analysis.
5	Case Studies of GIS Applications.
6.	Application GIS Development, Web based GIS & Open Source GIS.

Venue	Duration	Date
Faridabad	06 Months	Mutually Agreed

Who may attend: This Course can be attended by junior and middle level managers/executives/officers and sponsored candidates.

4.3.7 Post Graduate Certificate Course in E-Mobility and Smart Utilities

Objective

The overall course objective is to provide a well-rounded exposure to Graduate Engineers / Utility Personnel with various aspects of Electric Vehicles, Understand Mobility and its evolutions, Smart Grid, Smart Water & Smart Gas Utility. This course is intended to be delivered through classroom session at NPTI, Faridabad with practical's/Site Visits/Projects/Internships.

Program Profile

- General Introduction: - Evolution of Indian Power sector & Indian Electricity Act & Regulation.
- Various types of Power Generation (Hydro, Thermal, Nuclear & RE Sources).
- Basics of Power System, Traditional Grid and Micro Grid, Generation, Transmission & Distribution Challenges in India.
- Introduction to Smart Grids, Global Roadmaps, Regulatory Aspects, Smart Grid Vision & Roadmap for India, National Smart Grid Mission, Smart Grid Maturity Models, Smart Grid Architecture, Market Mechanism & Grid Standards.
- Advanced Meter Interface (AMI) - Overview, Smart Meters, DCUs, HES, MDM, Inter-operability, Standards, Protocols.
- ICT & Cyber Security and Smart Grid Security, IoT.
- Load Forecasting, Demand Side Management DER/DR/ SCADA/EMS, WAMS.
- Power Electronics, Reactive Power Management & Outage Management, PMU, Project, Procurement, Contract & its Financial Management.
- GIS & Assets Management: Asset Mapping and Consumer Indexing on GIS maps; and business process reengineering for GIS.
- Understand Mobility and its evolutions, Electric Mobility and Environmental Impact Reduction, Economic Analysis, Electric Mobility and Infrastructures: Technical and Economic Dimensions.
- International Standards for EVs and their impact on EV deployment, EV System architecture and concepts, EV Drives and Controllers.
- Energy Storage Systems and New Batteries Technologies, Potentials and Forecasts, EV Charging Systems(V2G and G2V)
- Power grid and renewable energy resources interfacing for EV Development (ICT services for EV ecosystem).
- Smart Cities & its Pilot projects in India, Innovative Solutions For Smart Cities, Green Environment, Smart Health, Water & Sanitation, Waste Water Management Through Innovation & Technology, Video Surveillance & Smart Lighting for Smart & Safe Cities, Adaptive Traffic Control System, Pollution Monitoring, Urban Planning, Smart Transportation.
- Laboratory Session, Simulator, Plant Visit and On-Job Training.
- Project Works followed by end examinations.

Venue	Duration	Date
Faridabad	16 Weeks	15-11-2020

Who may attend : The minimum qualification for admission is a B.E/B.Tech in any branch of Engineering. This course can also be attended by the Junior and Middle Level Managers/ Executives/officers.

4.3.8 Certificate Course for Hydro Power Plant Engineers and Supervisors

Objective

To prepare Engineers and Supervisors to work in Operation and Maintenance of Hydro Power Stations.

Program Profile

- Safety & First aid, General Introduction of Hydro Power Plant.
- Power Plant Familiarization of Hydro Power Plant Engineering.
- Construction details of Hydro Power Plant components : Generators, Turbine, Valves, Excitation System, Governing System etc.

- Switchgears, protection in HE station.
- Power Plant Operation and function of Load Dispatch Centre.
- Maintenance of Hydro Power Plant Equipment.
- Hydro Power Plant Simulator Training.
- Plant Operational Training at Hydro Power Plant (On-job).
- Plant maintenance Training at Hydro Power Plant (On-job).
- Final assessment & Evaluation.

Venue	Duration	Date
Nangal	12 Weeks	20-04-2020

Who may attend : Newly recruited Engineers and supervisors those posted in hydro power stations (Mechanical, Electrical & Instrumentation).

4.3.9 Specialized Training for Hydro Power Plant Working Engineers and Supervisors

Objective

To enhance knowledge & skill of working Engineers & Supervisors in O&M of Hydro Power Station.

Program Profile

- Concept of modern hydro power station, site selection, Components, layout.
- Hydraulic system, reservoir, storage capacity, dams and Barrages, intake, surge tank, power tunnels/channel, fore Bay and penstocks, pressure shaft, surge shaft, tail race and tail race tunnel/channel, protection against water hammer And negative pressure in penstocks and suction head, Dewatering of water conductor systems.
- O&M of Hydro Power Plant components; Generator, Turbine, Valve, Excitation system, Governing systems etc.
- Hydro Power Plant Simulator Training.
- Plant visits at Hydro Power Plant sites.

Venue	Duration	Date
Nangal	06 Weeks	01-06-2020
Shivpuri	12 Weeks	04-05-2020

Who may attend : Working Engineers and Supervisors in hydro power station (Mechanical, Electrical & Instrumentation).

4.3.10 Distribution Engineering

Objective

To familiarize the participants with various aspects of electricity distribution engineering.

Program Profile

- Distribution Engineering: Growth, Developments, Equipment, Standards specification, construction. Practice and guidelines, design aspects-testing and installation of Distribution equipment-Lay out of Sub-Station.
- Safety, Protection, DSM and energy Audit/Metering: Safety Aspects, I.E. Rules and Regulation, Compliance, First Aid, Fire Safety.
- Energy Audit and DSM application in Distribution /Engineering: Energy Audit - need, Objective and Methodology, types, application & techniques, DSM - Methodology and Techniques, Loss reduction - Voltage control, VAR control, Reactive Power Compensation.
- Metering: Metering techniques, various types - LT meters and its application, Installation Testing and Commissioning of LT meters, defects and remedies - HT metering techniques.
- Billing, Power System Study, Distribution Planning Trends and Development: Billing system, Computer application in billing system, Distribution planning, Optimization of capacity and location of Distribution Transformers - Power System study flow, fault analysis, relay co-ordination, Reactive Power compensation - Load Forecast techniques, recent trends & developments in Distribution Automation, Automatic Meter Reading.

Venue	Duration	Date
Nagpur	06 Weeks	As per Customer requirement

Who may attend : Engineers engaged in distribution of electricity with 2-3 years experience. The course can be conducted at New Delhi, Nagpur, Durgapur, Neyveli or Bengaluru Institute.

4.3.11 Control & Instrumentation for Supervisors / Technicians

Objective

To impart knowledge of theory and working principles of instruments and improve the skill of Instrumentation Supervisors Technicians in the field of Instrument Maintenance.

Program Profile

- Concept of instrumentation in Thermal Power Station.
- Instrumentation layout.
- Basic Science, Basic electricity and Basic Electronics.
- Pressure, Level, Low and Temperature measurement.
- Air supplies, pneumatic Instruments and drives.
- Telemetry.
- Introduction to Automatic Control System.
- DAS/DDC.
- Turbidity instruments and Analytical Instruments.
- Practicals/Demonstrations.

Venue	Duration	Date
Nagpur	06 Weeks	As per Customer requirement

Who may attend : Instrumentation Supervisors/Technicians working in Thermal Power Station/process Industry.

4.3.12 Training Programme for Supervisor/ Managerial Person Deployed in Power Industry

Objective

To impart Supervisory/Managerial skills to Middle level persons who are working in Power supply Industry.

Program Profile

- Personality Development: Skills, Attitudinal Development, Leadership, Team Building, Value & Ethics.
- Business Communication skills, Negotiation.
- Man Power Planning (MPP).
- Quality of work Life (QWL).
- Career Planning & Quality Circles.
- Financial Management & Overview.
- Performance Appraisal.
- Man Power Audit.
- Human Resource Development.
- Case Studies.

Venue	Duration	Date
Faridabad	06 Weeks	

Who may attend : Staff deployed in power station/Industry with experience of 5 to 10 years.

4.3.13 New and Renewable Sources and Grid Integration in India

Objective

To renewable energy program gives the participant a solid foundation in the theory, sign, installation and grid interfacing techniques required to work with new and renewable energy systems and technologies.

Program Profile

- Energy Sector Reforms, Regulations Environment and RE.
- Wind Energy Systems.
- Solar thermal power systems.
- Direct energy Conversion – Solar Photovoltaic, Fuel Cells.
- Waste to Energy.
- Solar passive Architecture.
- Biomass Energy Systems.
- Bio-Fuels
- RE and Grids Integration
- Economic Viability
- Case studies

Venue	Duration	Date
Alappuzha	06 Weeks	06-04-2020
Nagpur	06 Weeks	As per Customer requirement

Who may attend : Graduate engineers having 3-4 years experience in Thermal Power Stations.

4.3.14 Executive Development Program for the Supervisory Staff Working in Finance & Accounts Department

Objective

To impart knowledge of Supervisory Finance personnel working in Power Supply Industry.

Program Profile

- Status & Responsibilities of Financial Executives: Development of Managerial Skills.
- Personality Development, Business Communication Skills, Negotiation Skills, Leadership, Team Building, Values & Ethics etc.



NPTI Nagpur conducted program on 'Maintenance of Substation, Testing, Predictive Maintenance, Earthing, Safety, Regulations', from 20-08-2019 to 23-08-2019

- Financial Management & Planning.
- Computer Awareness for finance personnel.
- Capital Budgeting, Costing & decisions.
- Operating & Financial Leverage Analysis.
- Dividend issues, policy & Decisions.
- Budgeting & Accounting.
- Foreign Exchange, Taxation Rules & Regulations.
- Financial Performance Evaluation & Risk Management.
- Cash Flow Management.

Venue	Duration	Date
Faridabad	06 Weeks	Mutually Agreed

Who may attend : Supervisory staff working in Power Stations/ Industry with to 10 year of experience.



First ATAL Training Program at NPTI Shivpuri



Site Acceptance Testing of Simulator Module at NPTI Durgapur



17th Batch Four weeks Training on EHV Lines Using Cold Line Maintenance Techniques from 01 to 26, 2019 at HLTC Bengaluru



8 weeks Training Program on O&M of Thermal Power Plants for the participants of UPL at NPTI Badarpur



PGDC (PPE) students of NPTI Faridabad visit at BHEL Haridwar



Skill Development program on 'Welding Practice' under CSR of BPSCL at NPTI Durgapur

(D) SHORT TERM COURSES (1 DAY - 04 WEEKS)**4.4 POWER GENERATION AND ITS ANCILLARY EQUIPMENTS****4.4.1 An Overview of Supercritical Technology****Objective**

To appraise the working engineers of Sub-Critical Thermal Power Stations about the Supercritical Technology.

Program Profile

- General Aspects of Supercritical Technology: History of the Supercritical Technology.
- Difference between Current Trends and Supercritical Technology, Parameters and Design Variations, Efficiency and Environmental Aspects.
- Process Know-How: Constructional Features and Pressure Part Arrangements, Steam and Water Flow Circuit.
- Boiler Circulation System, Boiler Tube Material and Boiler Water Chemistry and its Treatment.
- Operational Aspects: Protection, Interlocks and Control, Safe Light Up and Shut Down, Part Load Operations.

Venue	Duration	Date
Durgapur	03 Days	09-09-2020

Who may attend : Working Engineers of Thermal Power Stations with 2-3 years experience.

4.4.2 Advanced Operational Practice of Supercritical Thermal Power Plant**Objective**

The objective of this course is to familiarize the Plant operation and dynamic control at elevated pressure requires lots of attention and monitoring control. To develop the concept flexible operation of boiler at higher pressure. Operational dynamics during the critical points creates challenges in operation, requires lots of expertise and training for smooth operation. Executives handling and operating power plant requires lots of training to avoid tripping of plant.

Program Profile

- Flexible condition and operation practices.
- Pre-checks of plants equipment's.
- Plant Operation and unit stabilization.
- Critical parameter monitoring.
- Data Analogy and unit equipment health monitoring.
- Emergencies and critical operation conditions in plant.

Venue	Duration	Date
Faridabad	02 Days	Mutually Agreed
Neyveli	02 Days	Mutually Agreed
Shivpuri	03 Days	01-07-2020

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.4.3 Issues Related to Supercritical Technology**Objective**

To familiarize the participants with super critical boilers and related issues.

Program Profile

- Introduction to supercritical technology, advantages - World scenario in super critical technology.
- Arrangement of super critical boilers.
- Comparison between spiral water wall circulating and vertical tubing.
- Special alloys for super critical boilers and welding techniques.

Venue	Duration	Date
Neyveli	02 Days	21-01-2021
Shivpuri	02 Days	21-01-2021

Who may attend : Engineers working in Power Stations.

4.4.4 Flexible Operation of Thermal Power Plants in India**Objective**

Operation of thermal power plant is always a challenge and it requires lot of expertise for developing hand on training for developing expertise in the same. As long as unit sizes are change it's require lot of attention for understanding the need of flexible operation of thermal power plant.

Program Profile

- Operational dynamics of thermal power plants.
- Design & Operational challenges in thermal power plants.
- Fuel characteristics viability for flexible operation in India.
- Plant load variability for sustainability of flexible operation.
- Recent advancement for flexible operation in supercritical and ultra-supercritical plants.

Venue	Duration	Date
Durgapur	01 Week	15-06-2020
	03 Days	10-02-2020

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.4.5 Thermal Power Station Operation**Objective**

To provide the participants the in-depth knowledge of various operational aspects of thermal power station so that correct, efficient and safe operation is ensured.

Program Profile

- Power Station Schemes.
- Boiler and Turbine controls.
- Excitation systems and AVR.
- Cold, Warm and hot start-ups.
- Steam Turbine governing and protection systems, trouble shooting.
- Boiler, Turbine, Generator and Integrated unit operation under normal and emergency conditions.
- Unit shut down procedures and safety.
- Performance monitoring.
- Duties and responsibilities of operation engineers.

Venue	Duration	Date
Badarpur	01 Week	18-05-2020
Neyveli	03 Days	13-05-2020
Nagpur	04 Days	04-08-2020
Shivpuri	03 Days	23-11-2020

Who may attend : Engineers having 1-2 years experience in Thermal Power Stations.

4.4.6 Boiler Operation/ Boiler & Its Auxiliaries Operation**Objective**

To acquaint the participants with the safe and efficient operation of boiler and its auxiliaries.

Program Profile

- Working principle, function and classification of Boilers.
- Description of Boiler components.
- Function and working principle of Boilers Auxiliaries-Mills & Feeders, fan, Air pre-heaters, soot blowers, etc.

Venue	Duration	Date
Badarpur	01 Week	23-11-2020
Neyveli	01 Week	20-07-2020 21-09-2020
Durgapur	01 Week	21-09-2020
Nagpur	04 Days	12-05-2020

Who may attend : Engineers having 1-2 years experience in Thermal Power Stations.

4.4.7 Boiler Firing System & Equipments

Objective

To acquaint the participants with the various types of Boiler firing systems, problems faced, rectification and trouble shooting.

Program Profile

- Combustion of Fuels.
- Different firing systems – tangential firing, wall firing and down shot firing- their requirements and applications Igniters.
- Oil atomizers.
- Coal Burners.
- Burner Management system.
- Direct Ignition of Pulverized Coal.
- Operation Procedure, Maintenance.
- Trouble Shooting in firing system components.

Venue	Duration	Date
Neyveli	03 Days	08-07-2020
Shivpuri	03 Days	08-07-2020

Who may attend : Operation & Maintenance engineers of Thermal Power Station with 4-5 years experience.

4.4.8 Boiler Efficiency

Objective

To provide updated technical know-how on boiler efficiency measurement and analysis procedure pertaining to fired steam generators used in fossil fired system.

Program Profile

- Different aspects of Efficiency measurements and measurement procedures.
- Boiler tuning for load ramping and condition of boiler Efficiency at various loading.
- ASME PTC 4.0 salient features of boiler performance checks.
- Case studies to improve boiler performance parameters.

Venue	Duration	Date
Durgapur	02 Days	23-07-2020

Who may attend : Efficiency & Operation Engineers, system performance Managers, who are having prior knowledge of various tools and technical measurement system for boiler performance / operation / commissioning. This is an executive (Technical) program aimed for professional power engineers.

4.4.9 Renovation & Modernization of Thermal Power Plant/Station

Objective

To familiarize and spread awareness amongst the Working Managers Engineers of Thermal Power Stations to enable them to take timely action for renovation & Modernization of their Thermal Power Station for further life extension.

Program Profile

- Norms for renovation & Thermal Power Station & Funds allocation.
- Scope of renovation & area of renovation.
- Renewal life Assessment Techniques for Turbine, Boilers and generator.
- Life extension studies and techniques for Thermal Power Station auxiliary.
- Stress Analysis and data interpretation.
- Case Studies.

Venue	Duration	Date
Mutually Agreed	01 Week	

Who may attend: Middle Level Managers/ Working Engineers with 2 to 3 years experience.

4.4.10 Steam Turbine & Its Aux. Operation

Objective

To familiarize the participants with operational procedure of turbine and its associated auxiliaries under various conditions of operation.

Program Profile

- Constructional features of turbine, turbine auxiliaries like condenser, pumps, feed heaters etc.

- Operational procedure of associated systems such as condensate, feed, lube oil, CW etc. On line cleaning system, Operation of boiler feed pump and condensate extraction pump.
- Interlock protection of turbine and its auxiliaries.
- Starting and shutting down of turbine.
- Operation of turbine under normal and emergency conditions.
- Emergencies & case studies.

Venue	Duration	Date
Badarpur	01 Week	11-01-2021
Neyveli	01 Week	01-06-2020
Durgapur	01 Week	07-12-2020
Nagpur	04 Days	02-03-2021
Shivpuri	01 Week	01-06-2020

Who may attend : Engineers with 3-4 years experience in Thermal Power Station.

4.4.11 Steam Turbine Governing

Objective

To render a special expertise to working Engineers of Thermal Power Stations.

Program Profile

- Introduction to Governing System, Concept of Nozzle Control and Throttle Control.
- Hydrodynamic Governing of LMW Turbine, Speed Governor and Follow Up Piston.
- Governing Oil System, Load cum Speed Governor.
- Summation Pilot Valve, Intermediate Pilot Valve and Servomotor of Nozzle.
- Control Valves, Protection of LMW Governing System
- EHG and MHG of KWU Governing System.
- Concept of Minimum Gate Principle and Electro-Hydraulic Converter and Hydro-Hydraulic Converter.
- Application of Different Governing Oils of KWU System.
- Follow Up Piston and Development of Secondary Sensitive Oil and its Application.
- Protection System of KWU Governing System and its Application on Different Modes of Start Up.
- Application of Governing System in Accordance with HP/LP Bypass System.
- Concept of Digital Electro-Hydraulic (DEH) Governing System of Chinese Units.
- Application of High Pressure Governing Oil in DEH System.

Venue	Duration	Date
Durgapur	03 Days	20-07-2020

Who may attend : Working Engineers of Thermal Power Stations.

4.4.12 Generator & Auxilliaries Including Excitation System

Objective

To develop proper understanding of the generator and auxiliaries along with the various excitation systems and their characteristics.

Program Profile

- Generator construction and design aspects.
- Generator characteristics, synchronization & parallel operation
- Generator protection.
- Excitation & AVR-various types and their selection aspects.
- Problems faced.
- Case studies.

Venue	Duration	Date
Badarpur	01 Week	14-12-2020
Neyveli	03 Days	02-12-2020
Durgapur	01 Week	12-08-2020
Nagpur	03 Days	08-07-2020
Shivpuri	03 Days	02-12-2020

Who may attend : Engineers with 2-3 years experience in erection, commissioning operation and maintenance of generator system.

4.4.13 Emerging Trends in Excitation System & AVR

Objective

To develop proper understanding of the various excitation systems and their Characteristics including Automatic Voltage Regulator.

Program Profile

- Excitation System - Introduction, Types, Selection and Salient Features.
- Static Excitation System – Construction, operational Features and Case Studies.
- Brushless Excitation System – Description, operational Features and Case Studies/Developments in AVR and Limiters.

Venue	Duration	Date
Durgapur	02 Days	14-05-2020
Shivpuri	03 Days	10-02-2021

Who may attend : Engineers with 2-3 years experience in erection, commissioning operation and maintenance of generator system.

4.4.14 Thermal Power Plant Efficiency & Performance Monitoring

Objective

To acquaint the trainees with the latest techniques of monitoring and testing of unit performance, analysing data and suggesting ways and means for performance improvement.

Program Profile

- Steam cycle theory and optimization.
- To identify and record the factors and data needed for monitoring efficiency and performance.
- Analysis of the performance of different systems and equipments like station heatbalance, mill performance, condenser performance, feed heaters performance, boiler efficiency, turbine efficiency etc.
- Correlation among different systems and their effect on performance.
- Application of computer for performance calculation and analysis.
- Improvement of plant availability through efficiency and performance monitoring.
- Plant on-job/practicals.

Venue	Duration	Date
Neyveli	03 Days	05-08-2020
Durgapur	03 Days	05-08-2020
Nagpur	03 Days	10-02-2021
Shivpuri	03 Days	04-11-2020

Who may attend : Power Station Engineers having 2-3 years experience in operation and maintenance.

4.4.15 Gas Turbine & CCGP Refresher Course

Objective

To familiarise the Engineers with Gas Turbine and Combined Cycle Power Plants and their role in the Indian Power Scenario, fuel options, efficient operation.

Program Profile

- Philosophy of Gas Turbine and Combined Cycle Power Plant.
- Fuel Options.
- Waste Heat Recovery Boiler.
- Steam Turbine and Associated Auxiliaries.
- Operational aspects and efficiency.
- Visit to modern Combined Cycle Power Plant.
- Case Studies.

Venue	Duration	Date
Badarpur	01 Week	20-04-2020
Neyveli	03 Days	03-02-2021

Who may attend : Engineers working in Gas Turbine & Combined Cycle Power Plants in the field of design, erection, commissioning and operation & maintenance.

4.4.16 Large Capacity CFBC Boilers

Objective

To familiarize the advantages of large capacity CFBC boilers.

Program Profile

- Introduction to CFBC Technology Advantages, Scope, Fuel flexibility, etc.
- Description of various components of CFBC Boiler.
- Environmental benefits.
- Limitations, major concerns in the O&M of CFBC Boilers.
- Visit to CFBC Boilers.

Venue	Duration	Date
Neyveli	03 Days	11-11-2020

Who may attend : Engineers working in Power Stations.

4.4.17 Regenerative Feed Heating System

Objective

To familiarize and impart knowledge regarding operational procedure system with confidence and safety.

Program Profile

- Different types of heater – H.P. & L.P.
- Theory of heating, construction of HP & LP heaters.
- System of steam extraction.
- layout of system – various considerations.
- Operation of the individual components.
- Cutting in and cutting out procedures of heaters.
- Performance monitoring of heaters and identification in the system.
- Various interlocks and protections and Automatic systems.

Venue	Duration
Mutually Agreed	1 Week

Who may attend : Operators working in Thermal Power Station with 3-4 years experience.

4.4.18 Fans & Air Heaters

Objective

To acquaint the participants with the various types of fans and airheaters used in thermal power stations and their selection and design engineering aspects.

Program Profile

- Fans: Different types of fans and their applications, engineering, design and selection criteria.
- Construction details and components description for different types of fans.
- Fan operation techniques in series/ parallel conditions.
- Fan characteristics and performance monitoring.
- Condition Monitoring: Vibration measurement, rubbing sound measurement and other diagnostic studies.
- Fan maintenance procedures and practices.
- Air Heater: Different types, their design construction and selection aspects etc.
- Alignment & Adjustment Techniques of seals.
- Lubrication.
- Problems-Case studies and analysis.

Venue	Duration	Date
Neyveli	03 Days	27-05-2020
Shivpuri	03 Days	27-05-2020

Who may attend : Engineers with 1-2 years of experience in O&M of Boilers/ auxiliaries in a Thermal Power Station/Industry.

4.4.19 Electrostatic Precipitator

Objective

To impart knowledge on installation, maintenance and operation of ESPs and their control circuits.

Program Profile

- General discussion on pollution.
- Types of ESP & selection aspects.
- Principles of construction & functioning of ESP.
- Corona and Ionization.
- Description of Dust precipitator.

- Installation, Operation and Maintenance of ESP.
- Mechanical Parts Maintenance.
- Electrical control circuit maintenance and checking. Efficiency and performance of ESPs and Factors affecting the performance.

Venue	Duration	Date
Neyveli	03 Days	17-06-2020
Shivpuri	03 Days	17-06-2020

Who may attend : Engineers engaged in operation and maintenance of power station & process industry with 2-3 years experience.

4.4.20 Valves & Pumps in Power Plants Engineering

Objective

To acquaint in trainees with modern methods of operation and maintenance of Pumps and Valves at Thermal Power Plant, so that at the end the course the trainees will be able to understand the importance of Pumps and Valves.

Programme Profile

Description of different types of Pumps and their construction, Selection & Operational aspect.

Venue	Duration	Date
Nangal	03 Days	15-06-2020

Who may attend : Operators/Technicians working in Thermal Power Plant.

4.4.21 Operation & Maintenance (O&M) of Coal Mills & Feeders

Objective

To acquaint the participants with the latest Milling system, their operation and maintenance techniques so as to reduce the outage in the Thermal Power Stations.

Program Profile

- Description of different types of Mills & Milling system components such as Raw Coal Feeders, Classifiers and variators etc. their design, construction and selection aspects.
- Description of Coal grinding Principles and grinding elements.
- Frequently eroding parts and eroding characteristics analysis.
- Proper maintenance techniques and replacement procedures of eroding parts.
- Driving Mechanisms and their maintenance procedures.
- Lubrication and sealing system.
- Maintenance planning for Milling system.
- Routine Maintenance and Breakdown Maintenance of Milling Plant.
- Overhauling of Milling Plant.
- Preventive measures for stopping erosion of Pulverized Coal lines bends and their proper alignment.

Venue	Duration	Date
Neyveli	03 Days	25-11-2020

Who may attend : Engineers with 2-3 years experience in Operation and Maintenance in a Power Station.

4.4.22 Vibrational Analysis

Objectives

To familiarize and train the utility Engineers and Researchers regarding vibration, its analysis and control in rotating machines.

Programme Profile

- Introduction to Machinery vibration.
- Basic machinery vibrations.
- Machine vibration analysis.
- Balancing of rotating machinery & Alignment technologies.
- Advanced vibration analysis.
- Advanced vibration control.
- Practical rotor dynamics & modelling.
- Vibration measurement.

Venue	Duration	Date
Neyveli	03 Days	29-04-2020 13-08-2020
Durgapur	03 Days	24-06-2020
Shivpuri	03 Days	29-04-2020

Who may attend : Engineers/ Research Scholars.

4.4.23 Trouble Shooting of Steam Turbine Objective

To impart latest information about the techniques of trouble shooting of turbine and its remedial action.

Program Profile

- Details of Steam Turbine, bearing and its Lubrication.
- Turbine dynamics and vibration theory.
- Causes of Vibration in Turbine and Case Studies.
- Measurement and interpretation of vibration signatures.
- Condition Monitoring and Performance Monitoring.
- Types of turbine Failure and its remedy.

Venue	Duration	Date
Durgapur	03 Days	02-09-2020

Who may attend: Engineers from SEBs/Power Utilities/corporations with 2-3 years of experience.

4.4.24 Reliability Centered Maintenance of Rotary Equipments

Objective

The objective of the course is to give a thorough knowledge to the Engineers working in the Maintenance Section, regarding the recent maintenance techniques and systems of the rotary equipments. This special and modern development of maintenance system will also enhance the conventional maintenance skill of the engineers.

Program Profile

- Introduction to Reliability Centered Maintenance (RCM); steps and benefits of RCM.
- First approach to RCM-Functions, failure and significant of Rotary equipments, consequences of failure as per RCM.
- Reliability centered maintenance tasks for Rotary equipments.
- Condition monitoring of rotary equipments-as an important role for RCM.
- Description of condition monitoring equipments.
- Description of vibration and signature analysis.
- RCM recording systems and documentation system.
- Preventive maintenance techniques of pumps, fans, turbine and other rotary equipments.
- Overhauling job schedule for the above mentioned equipments.
- Trouble shooting and failure diagnosis of rotary equipments.
- Bearings, Lubrication and tribology.
- Balancing and Alignment of rotary equipments.

Venue	Duration	Date
Badarpur	1 Week	20-07-2020

Who may attend : Experienced Engineers working in Power Plants, Utility Industries and other Industries.

4.4.25 Non Destructive Testing & Welding Defects Objective

Objective of the course is to create technically trained manpower and to make working Engineers aware of the various NDT procedures being adopted for inspection of welding joints & other materials.

Program Profile

- Introduction to Non Destructive Testing Procedures.
- Welding defects and associated Non Destructive Testing Methods.
- Types of material defects.
- Various NDT Techniques and their Applications.
- Dye Penetrant Test.
- Magnetic Participle Test.
- Ultrasonic NDT Methods.
- Ultrasonic Flaw Detectors.
- Eddy Currents Non Destructive Testing.
- Radiography & Test Applications.
- Applicable ASTM Standards.
- Various Types of weldings Defects & Preparation of Welding Procedures in various positions as per AWS.

Venue	Duration	Date
Badarpur	1 Week	24-08-2020

Who may attend : Engineers/Supervisors with one or two years relevant experience may attend.

4.4.26 Electrical Motor for Power Plant & its Maintenance

Objective

To acquaint the trainees with the correct and modern methods of maintenance of electrical motors. At the end of the course the trainees will be able to undertake maintenance of motors with confidence.

Program Profile

- Theory of different types of motors.
- Constructional details of different types of motors.
- Terminal connections and terminal box.
- Mounting/Enclosures, insulation material used in motors.
- Stripping down seven inspections of motors.
- Cleaning and inspection.
- Bearings used in motors.
- Assembling, testing and commissioning.
- Problems of motor-case studies.

Venue	Duration	Date
Neyveli	03 Days	25-11-2020
Shivpuri	03 Days	16-12-2020

Who may attend : Maintenance technicians with 2-3 years experience with basic knowledge of electricity upto ITI Standard.

4.4.27 Fan & Air Heaters Maintenance

Objective

To expose the technicians to various maintenance requirements and procedures, develop necessary skill to carry out the maintenance and the safe use of special tools and tackles.

Program Profile

- Classification of Fans and Air heaters and their applications in thermal power stations.
- Constructional details, operation and maintenance techniques of different Fans & Air Heaters.
- Causes of erosion, corrosion, vibration and their remedies. Load regulating system of Fans.
- Problems of Fan & Air heaters – Case Studies.

Venue	Duration	Date
Badarpur	1 Week	01-06-2020

Who may attend : Technicians working in power station with 2-3 years experience.

4.4.28 Bearing Maintenance and Shaft Alignment

Objective

To enable the participants to carry out maintenance of bearings and shaft alignment with modern techniques using tools and procedures correctly. After completion of course, trainees will be in a position to carry out their maintenance jobs independently.

Program Profile

- Classification of Bearings.
- Inspection of Bearings.
- Bearing materials.
- Friction and its effect on bearing performance.
- Top side gaps adjustments of sleeve/ bearings/ journal grooving on plain bearings, scrapping of journal bearings selection of bearing lubrications and their purification.
- Handling and Storage of bearings.
- Care and maintenance of plain bearings, Anti friction bearings.
- Types of coupling and their uses.

Venue	Duration	Date
Badarpur	1 Week	11-05-2020
Neyveli	03 Days	08-03-2021
Nagpur	04 Days	21-12-2020
Shivpuri	03 Days	08-03-2021

Who may attend : Maintenance technicians with 2-3 years experience in the relevant field.

4.4.29 Pump Maintenance

Objective

To acquaint the trainees with correct and modern methods of operations & maintenance of pumps so that at the end of course the trainees will be able to undertake maintenance of pumps independently.

Program Profile

- Description of different types of pumps, their construction, operation and applications.
- Single stage horizontal.
- Double stage vertical, Multi stage horizontal.
- Gear pump: Description of associated parts (fixed and movable)
- To acquaint the trainees with essential maintenance procedures like: Gland packing.
- Bearing removal and inspection, coupling design.
- Clearance and renovation of wear-rings impellers.
- Correct use of tools.
- Inspection of parts for wear and tear.
- Inspection of parts for wear and tear.
- Use of measuring instruments.
- Producing a joint for replacement.

Venue	Duration	Date
Neyveli	03 Days	10-02-2021
Nagpur	03 Days	20-01-2021

Who may attend : Maintenance Technicians with 2-3 years experience in the relevant field.

4.4.30 Selection, O&M and Condition Monitoring of Large Electrical Motors and Generators for Industries and Power Plant Applications

Objective

To appraise the participants about the predictive maintenance for optimum and reliable equipment performance.

Outline

- Maintenance-Introduction types scheduling, Testing & Requirements of CBM.
- On line monitoring system of Rotating machines including partial discharge monitoring for stator windings and Rotor Flux Monitoring system for Turn shorts and case studies.
- On-line vibration monitoring system and case studies-turbo generator and HT Motors.
- Field Visits.

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	16-12-2020

Who may attend : Engineers with 2-3 years experience.

4.4.31 Condition Based Maintenance Aspect of Electrical Equipments

Objective

To appraise the participants about the predictive means of maintenance for optimum and reliable equipment performance.

Program Profile

- Maintenance – Introduction, Types, Scheduling, Testing and Requirement of CBM.
- Online monitoring system of Rotating Machines including Partial Discharge Monitoring for Stator Windings and Rotor Flux Monitoring System for Turn Shorts and Case studies.
- On Line Vibration Monitoring System and Case Studies – Turbo Generator & HT Motors.

Venue	Duration	Date
Shivpuri	03 Days	15-07-2020
Durgapur	03 Days	14-10-2020

Who may attend : Engineers with 2-3 years experience.

4.4.32 Valve and Pump Maintenance

Objective

To acquaint the trainees with correct and modern methods of operation and maintenance of valves and pumps so that at the end of the course the trainees will be able to undertake maintenance of valves and pumps independently with confidence.

Program Profile

- Description of different types of valves, their construction, operation and applications.
- Correct use of tools, Dismantling.
- Identifying the types of valves.
- Replacement of worn out or damaged parts.
- Description of different types of pumps, their construction, operation and applications.
- Single stage and multi stage centrifugal pump.
- Maintenance of BFP & CEP.
- Trouble Shooting.

Venue	Duration	Date
Badarpur	01 Week	02-11-2020

Who may attend : Engineers from SEBs/Power Utilities/corporations with 2-3 years of experience in relevant field of power station.

4.4.33 Pumps Operation, Maintenance and Performance Monitoring

Objective

To acquaint the participants with the various aspects of pumps and the associated problems in their operation and maintenance.

Program Profile

- Different types of pumps, their application & selection criteria for Power Station.
- Theory & working principles of different type of Pumps.
- Design & selection aspects and construction of boiler feed pump.
- CW Pumps.
- Special aspects of positive displacement Pumps.
- Components material selection for pumps installation & commissioning.
- Operation & trouble shooting.
- Maintenance Aspects.
- Pump Characteristics on series/parallel operation.
- Performance assessments techniques & Monitoring Case Studies.

Venue	Duration	Date
Badarpur	01 Week	07-12-2020
Neyveli	01 Week	06-04-2020
Nagpur	03 Days	07-10-2020

Who may attend : Engineers of Power Plant & Industry.

4.4.34 Valve Actuators Maintenance

Objective

To train the participants on Actuators and associated gears and maintenance aspects.

Program Profile

- Different types of actuators and their selection.
- Description and working of: Electric, Pneumatic and Hydraulic Actuators.
- Maintenance of seals.
- Gears and Levers.
- Setting and checking of actuators.
- Limit switches and torque switches.
- Actuator control equipment including position control.
- Feed back circuits and thyristors.

Venue	Duration	Date
Neyveli	03 Days	04-05-2020

Who may attend : Power station technicians working in electrical and C&I maintenance sections.

4.4.35 Valve Maintenance

Objective

To acquaint the trainees with correct and modern methods of operation & maintenance of valves so that at the end of the course the trainees will be able to undertake maintenance of valves independently with confidence.

Program Profile

- Description of different types of valves, their construction, operation and applications.
- Correct use of tools, Dismantling.
- Identifying the types of valves.
- Replacement of worn-out or damaged parts.
- Use of correct lapping discs.
- Overhaul and maintenance of cover joints and bonnet joints.
- Correct method of cutting & jointing.
- Overhauling of valves.
- Hydraulic testing of valves.

Venue	Duration	Date
Neyveli	03 Days	17-06-2020

Who may attend : The course is for technicians with 2-3 years experience in relevant field of Power Station.

4.4.36 Boiler Tube Failure and Case Studies

Objective

To appraise the participants regarding the causes of boiler tube failure and to impart the knowledge of tube failure analysis, locating tube failure, job involvement after tube failure etc. to the Power Plant Engineers.

Program Profile

- Types of Boiler Tube Failure and their classification.
- Causes of different types of tube fails and their analysis.
- Understanding and locating tube failure by operational parameters at running condition.
- Job involvement for physically locating the tube failure at shut down condition.
- Tube failure rectification.
- Control of boiler tube failures.
- Different case studies.

Venue	Duration	Date
Durgapur	1 Week	13-07-2020
Neyveli	02 Days	25-06-2020
Shivpuri	02 Days	25-06-2020

Who may attend : Engineers working in Thermal Power Plant & other industries who deal with boiler (either operation or maintenance or both).

4.4.37 Welding Practices

Objective

To improve the skill of the personnel engaged in the field of welding both in construction and maintenance areas.

Program Profile

- Different types of welding and their processes.
- Gas welding – techniques, equipments used, choice of flames, flux & filler metals, gas welding joints.
- Oxy-fuel Gas Cutting-Process, techniques and equipments used.
- Shielded (Coated) Metal Arc Welding (SMAW) techniques machines & equipments used, joints design, classification and proper selection of electrodes.
- High Pressure Welding-TIG welding and its techniques, power sources & equipments used.
- MIG/MAG Welding—Techniques, equipments, accessories, shielding gases, filler rods.
- Welding Techniques for ferrous and nonferrous metals.
- Welding Defects, NDT, Heat Treatments.

Venue	Duration	Date
Durgapur	01 Week	24-08-2020

Who may attend : Operator working in Thermal Power Station with 3-4 years experience.

4.4.38 Advanced Welding and Testing Technologies

Objective

To train the participants in the field of welding and Non-Destructive testing of weldments.

Program Profile

- Introduction to welding and different welding process.
- Need for inspection and testing of welding - Stages of inspection.
- Testing methods for detecting external & internal flaws.
- Types of weld surface defects – its causes and remedial measures.
- Application of NDT and DT Eddy current testing Techniques.
- LPT, MPT, RFI, UT.
- Interpretation & Evaluation of Indicators.
- Test Procedure & Standards.

Venue	Duration	Date
Neyveli	03 Days	01-07-2020 09-09-2020

Who May attend : Engineers/ Managers/ Researcher from Utilities.

4.4.39 Condition Based Maintenance for Rotary Equipments

Objective

To appraise the participants about the predictive means of Mechanical Maintenance for optimum and reliable rotary equipment performance.

Program Profile

- Aims and objectives of CBM.
- Various methods adopted for CBM.
- Vibration analysis of rotary equipments.
- Procedure of balancing of rotary equipments.
- Alignment of rotary equipments.
- Case study on balancing and alignment.

Venue	Duration	Date
Durgapur	03 Days	07-10-2020

Who may attend : Maintenance/Performance Monitoring Engineers with 3-4 years experiences.

4.4.40 Power Plant Chemistry for Operation Engineers

Objective

To provide understanding and knowledge to the Operation Engineers on various techniques of chemical controls and their effect on-plant performance and failure. The program will help the Operation Engineers in day-to-day for decision making and also in emergencies.

Program Profile

- Corrosion/depositions in Boiler, Steam Turbine condensers and their prevention techniques.
- Acid cleaning of boiler/condensers etc.
- Unit preservation during idle time.
- Characterization of coal for the power plant.
- Optimization of combustion.

Venue	Duration	Date
Badarpur	1 Week	07-09-2020
Durgapur	1 Week	27-07-2020
Nagpur	04 Days	20-10-2020
Shivpuri	03 Days	15-06-2020

Who may attend : Operation Engineers with experience as Shift In-charge Engineers/ Operation Engineer.

4.4.41 Balancing and Alignment Techniques

Objective

Trainees will learn about practical procedure of balancing and alignment techniques of heavy duty rotary machines, relevant to Thermal Power Plants.

Program Profile

- Causes of vibrations and types of balancing requirements.
- Static and dynamic balancing techniques.
- Identification technique of misalignment.
- Hot alignment and tolerance in alignment for various applications.

Venue	Duration	Date
Alapuzzaha	03 Days	Mutually Agreed

Who may attend :



Training Program on 'Maintenance of Substation: Testing, Predictive Maintenance, Earthing, Safety Rules, Regulation & I.S' for the participants of MSETCL from 18-21 December 2019

4.5 HYDRO POWER AND RENEWABLE ENERGY SYSTEMS

4.5.1 Small, Mini and Micro Hydro Power Generation

Objective

To provide in-depth approach and technical know-how for different Hydro Power Generations.

Program Profile

- General Principles & Theory.
- Introduction of small, mini and hydro power generations.
- Hydrology and estimation of water potential.
- Basic features of hydro Turbines.
- Plant visit.

Venue	Duration	Date
Nangal	03 Days	05-10-2020

Who may attend : Engineers working in Hydro Power Plants.

4.5.2 Hydro Turbines, Governing & its Protection Systems

Objective

To provide in-depth technical know-how for governing system and its protections for safe loading & operation of HE plant.

Program Profile

General Principles and description of different type of governing systems. Speed control devices and wicket gate operation.

Venue	Duration	Date
Nangal	01 Week	07-09-2020

Who may attend : Engineers working in Hydro Power plants.

4.5.3 Hydro Generator & Its Excitation Systems

Objective

To provide the in-depth knowledge of Hydro Generator & its Excitation systems.

Program Profile

Constructional details and working principles of Generator and excitation systems. Types of Excitation systems and their components main and pilot exciters, Thyristor, FCB & AVR.

Venue	Duration	Date
Nangal	01 Week	06-07-2020

Who may attend : Engineers/Sr. Engineers working in Hydro Power Plant.

4.5.4 Valves & Pumps in Hydro Power Plants

Objective

To give acquaint the trainees in-depth knowledge of operation and maintenance of Pumps and Valves at Hydro Power Plant.

Programme Profile

Hydro plant valves: Constructional details and features of valves and their types (Butterfly, Spherical, Needle etc).

Hydro plant Pumps: Constructional details and working principals of various types of pumps used in H.E. stations and their operation & control system.

Venue	Duration	Date
Nangal	3 Days	20-07-2020

Who may attend : Working professionals from hydro power station.

4.5.5 Auxiliaries in Hydro Power Plants

Objective

To acquaint the trainees with the hydro power station auxiliaries & equipments.

Program Profile

- **Electrical Auxiliaries:** station lighting and automatic changeover. Station batteries and charging methods. Station emergency lighting arrangements, Elevator/lifts, Ventilation system, EOT cranes and hoists, Compressed air system, Dewatering and drainage system, Communication systems etc.
- **Mechanical Auxiliaries:** Oil pressure units, Lubrication principles and their characteristics, HP lubrication system, Braking and jacking system, Central release lubrication system, Carbon dust collection system for slip rings, excitors and brake pads, Cooling water system etc.

Venue	Duration	Date
Nangal	03 Days	24-08-2020

Who may attend : Engineers/Shift Engineers/Operators working in hydro power plant.

4.5.6 Hydro Power Plant Operation

Objective

To Provide in-depth knowledge in Hydro Power Plant Operation.

Program Profile

General principals of Hydro machine start and stop procedure and sequence. Operation of modern Hydro power station & features of pumps storage plant. Generator-Synchronizing, loading, parallel operation, active and reactive power sharing and frequency control, operation during emergency conditions. Declared capacity, scheduling & ABT based system UI, CI etc.

Venue	Duration	Date
Nangal	01 Week	11-05-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.

4.5.7 Specialized Training Programme on Hydro Power Plant Engineering

Objective

To prepare Engineers to become Power Station Managers in Operation and Maintenance of Hydro Power Stations.

Program Profile

- Class room session.
- Concept of modern hydro power plant.
- Site selection, components and layout.
- Description of Hydro Power plant components & Operational aspects.
- Plant visits at Hydro Power Plant sites.
- Hydro Power Plant Simulator.

Venue	Duration	Date
Nangal	03 Weeks	18-05-2020

Who may attend : Newly recruited and working engineers & supervisors in hydro power station (Mechanical, Electrical & Instrumentation).

4.5.8 Green Energy for Clean Environment / Green Energy Technologies

Objective

The main aim of the workshop would be to understand the scenario, issues and challenges, technological developments of Green Energy in India and Government initiatives and Schemes. Issues related to evacuation of Green Energy and the efforts made by the Govt. for creation of green Energy Corridor shall be highlighted.

Program Profile

- Issues and Challenges for development of Green Energy in India.
- Current Technologies for Green Energy Development.
- Regulatory Framework for Green Energy in India.
- Green Energy Corridors.

- Greening the Grid Report.

Venue	Duration	Date
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Faridabad	01 Day	
Shivpuri	01 Week	18-05-2020
Neyveli	01 Week	18-05-2020

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering and Science Graduates and Entrepreneurs.

4.5.9 Clean Energy Technologies

Objective

To enable the learners to understand the clean energy technologies, their importance, advantage compared to conventional energy sources environment impacts, economic feasibility, clean energy sources and their socio-economic issues.

Program Profile

- Solar Energy conversion (Photovoltaic, Thermal and combination of both).
- Wind power and its generation of electricity, applications and future scopes.
- Biomass energy utilization, conversion technologies (Thermo chemical, bio-chemical).
- Biofuels (biodiesels, biogas, producer gas and natural gas) their production and utilization.
- Hydro-electric power generation and its different types.
- Hybrid energy system.
- Energy Storages.
- Cost analysis of different clean technologies.

Venue	Duration	Date
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Neyveli	01 Week	18-05-2020
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Who May attend : Engineers/Faculties/ Research Scholars/ PG students.

4.5.10 Waste to Energy : Green Energy Development

Objective

Due to fast urbanization, various small town converted into big town and population is increasing day by day. By increase of population per capita waste generation is increasing day by day and requires lots of attention for managing the waste. Energy generation from waste is an option for managing solid waste in cities. By generating energy from waste is not only reducing waste volume but also development clean environment.

Program Profile

- Waste characteristics analysis.
- Waste generation analysis.
- Waste to energy : Technology selection.
- Environment norms for plant.
- Commercial aspect and tariff structure of waste to energy.
- Case studies of waste to energy plant.

Venue	Duration	Date
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Faridabad	02 Days	Mutually Agreed
Guwahati	02 Days	Mutually Agreed

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.5.11 Skill Development Program on "Renewable Energy"

Objective

This Program is designed with the objective of developing the skills of the participants in tapping various sources of Renewable Energy including solar, wind, bio energy, Small hydro etc., its engineering design, and related equipment details.

Program Schedule

- Module 1: Statistics on Conventional Energy Sources & Introduction to Renewable Energy Sources: Basics of Electrical Engineering, Different types of Electrical Load, Wires and Cables, Concept of Magnetism & Alternating Current, Generation, Transmission and Distribution of Electricity,

Concepts and Classification of Non Conventional Energy Sources, Renewable Energy and its prospects various RE Sources, Energy Flow in Ecosystem, Physics of semiconductors and Solar cell technologies, Solar Radiation and its Measurements.

- Module 2: Solar Energy Components of a PV System: Battery, inverter and Charge controllers, Various Tracking mechanisms, Trouble Shooting of different PV system and its important tools used, Solar Thermal Systems, Installation of Solar Power Plant, Commissioning and Testing of Solar Power Plant, O & M of Solar Power Plant, Importance of Tools and its applications used in the field of Solar Technology, Techno-economic analysis of solar thermal and solar PV power plants, Grid Integration and System Operational Aspects, Jawaharlal Nehru National Solar Mission, MNRE guidelines, DPR preparation for power plants. Visit to a solar power plant.
- Module 3: Wind Energy: Basics and Physics of Wind Energy, Wind systems in India, Wind measurements, instrumentation and data characteristics, Spatial wind resource assessment tools, Grid Integration and System Operational Aspects, Generation Modeling and Control Wind Power Project, Planning & Structuring, Solar Wind Hybrid System. Technical visit to a Wind farm.
- Module 4
Other Renewable Energy Sources: Small Hydro Resources, Geothermal and Ocean Energy Resources, Bio Energy Resources, Wave and Tidal Energy Resources, RE Grid Integration and System Operational Aspects, Financial feasibility of Renewable Energy Technologies.

Venue	Duration	Date
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Alapuzzaha	04 Weeks	As per Customer requirement
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Shivpuri	04 Weeks	As per Customer requirement
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Who may attend : Diploma and Graduate Engineers.

4.5.12 Solar Power Technologies

Objectives

Renewable Energy Technologies are now fundamental to growing global effort to combat the effect of climate change. The objective of the course is to understand the domain of Renewable Energy in a relevant manner.

Outline

- Introduction to JNNSM.
- Solar PV.
- Solar Thermal.
- Wind Power.
- Bio-Mass Power.
- Waste to energy.

Venue	Duration	Date
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Alapuzzaha	03 Days	22-04-2020
Durgapur	03 Days	08-03-2021

Who may attend : Engineers with 2-3 years experience.

4.5.13 Entrepreneurship Development Program on Solar PV Rooftop

Objective

The primary objective of the proposed training program is to ensure a comprehensive understanding of the solar PV Rooftop amongst stakeholders entering this sector. The five-days training programs are particularly focused on entrepreneurs who wish to start a Solar PV Rooftop business.

Program Profile

- Provide basic information on solar PV Rooftop and raise awareness amongst entrepreneurs on the following.
- Concept, design and components with specific focus on technical architecture of solar PV rooftop system.
- Policy and regulatory framework for Solar PV Rooftop at the national and state level.
- Business models followed in the solar PV Rooftop market and role of respective stakeholders.
- Provide specific information to the entrepreneurs on Solar PV Rooftop project costing and financing, Preparation of feasibility reports.

Venue	Duration	Date
Faridabad	01 Week	Mutually Agreed
Guwahati	01 Week	Mutually Agreed
Nangal	01 Week	Mutually Agreed

Who may attend : Science Graduates, Engineering Graduates (Mechanical, Industrial, Production, Electrical and Electronics), Management Graduates (Preference will be given to Science and Engineering Graduates).

4.5.14 Solar Photovoltaic Training For Master Trainers of Technicians

Objective

This program aims at training people in installation, operation and maintenance of solar PV systems. The program is useful for master trainers of technicians in Indian Technical Institutes (ITIs) and Polytechnics as well as supervising technicians working in the field. The program is useful for technician trainers in various disciplines: electrical, mechanical, civil, computer and systems.

Program Profile

- Classroom Topics.
- Introduction to Renewable energy and Photovoltaics (PV).
- Solar Radiation Basics and Measurement.
- Solar Cells, Modules and Arrays, Basics of Electricity.
- Battery, Charge Controller and Inverter Basics.
- Solar PV Systems Design and Components Selection.
- Balance of Systems Components.
- Plant Safety, Tools and Assembly, Plant Installation and Testing and O&M.
- Proposed Laboratory Experiments: Solar Radiation Measurement, Measurement of PV module parameters, Series and Parallel connections of modules, Solar LED Light, Inverter, Rectifier and Transformer, Measurement of Battery, Charge Controller and Inverter parameters, Testing of Standalone PV system.
- Proposed Field Sessions : PV Panel Assembly, PV String Assembly, Grid connected PV Plant Assembly and Testing, PV plant Operation and Maintenance checks, Solar PV Modules/ BoS components manufacturing site visit.

Venue	Duration	Date
Faridabad	01 Week	30-08-2020

Who may attend : Faculty members from ITI and polytechnic colleges, Supervising Technicians having ITI or polytechnic degrees.

4.5.15 Development of Floating Solar PV System (FSPV) in India

Objective

Solar power installations primarily ground mounted and solar roof mounted are increasing in number in India. This includes ground mounted/ roof mounted solar primarily. floating Solar PV plants also offer a huge opportunity, due to huge availability of water.

Program Profile

- Concept note and design documentation for FSPV
- Constraints and challenges in FSPV system.
- Layout and materials integration plan.
- Challenges in erection and commissioning, Testing.
- Integration and water saving potential of FSPV System.

Venue	Duration	Date
Faridabad	01 Day	06-11-2020

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.5.16 Solar PV (Photovoltaic) System Design and Installation

Objective

This program aims at training people in installation, operation and maintenance of solar PV systems. The program is useful for entrepreneurs and engineers working in the field. The program is useful for engineers in various disciplines: electrical, mechanical, civil, computer and systems.

Program Profile

- Classroom Topics.
- World Energy Scenario and Indian Perspective, Renewable Energy Technologies, Role of Solar PV and policies in India, Basics of Electricity, Introduction to Instruments.
- Introduction to Solar Radiation, Optimum orientation of Solar PV modules, Solar related measuring devices.
- Solar PV Electricity, Introduction of Solar PV Modules, Interconnections of PV Modules, Impact of environmental parameters on module performance.
- Introduction to Battery technologies, Charge controller, MPPT, Solar PV inverters.
- Types of Solar PV systems, Introduction to Solar PV system design.
- Grid Solar PV system design with DC load, Grid Solar PV system design with water pump, Example of Solar Power packs for homes/industrial applications, Example of Solar Power packs for homes/ industrial applications.
- Design of Grid, Connected Solar PV systems
- Wires and Cable sizing, Junction Boxes, Combiner Boxes, Fuses, etc.
- Solar PV system Installation, Monitoring and Trouble Shooting, Introduction to Solar lamps, Solar Products available in the market.
- Proposed Laboratory Experiments: Solar Radiation Measurement, Measurement of PV module parameters, Series and Parallel connections of modules, Inverter, Rectifier and Transformer, Measurement of Battery, Charge Controller and Inverter parameters, Testing of Standalone PV system.
- Proposed Field Sessions: PV Panel Assembly, PV String Assembly, Grid connected PV Plant Assembly and Testing, PV plant Operation and Maintenance checks, Solar PV Modules/ BoS components manufacturing site visit.

Venue	Duration	Date
Faridabad	01 Week	
Durgapur	01 Week	01-04-2020 01-07-2020 01-10-2020 01-01-2021
Guwahati	01 Week	
Neyveli	01 Week	17-08-2020
	02 Days	24-04-2020 12-03-2021
Shivpuri	02 Days	27-04-2020
Alapuzzaha	03 Days	08-06-2020

Who may attend : Newly recruited and working engineers & supervisors in solar PV power station (Mechanical, Electrical, Electrical & Instrumentation).

4.5.17 Solar Power Generation Technology - On Grid & Off Grid

Objective

To understand the significance of Renewable Energy particularly Solar Power Generation and Technology.

Program Profile

- Overview of renewable energy in India – Feasibility studies.
- Introduction to PV Technology Basic of Solar Cell & PV modules – Engineering Process Technology.
- Solar Charge Controller – Types, Basic of Solar Inverter.
- Introduction to SPV Design: Types of SPV system & their components.
- Basic Understanding of SPV System Integration.
- On grid / hybrid / grid-interactive SPV System.
- SPV Project implementation, basic criteria, requirements, standards & Procedures.
- Manufacturing Technology of Solar PV Modules.

Venue	Duration	Date
Durgapur	02 Days	17-08-2020

Who may attend : Engineers and Jr. Engineers with 1-2 years of experience.

4.5.18 Solar PV Panel - Installation, Maintenance and Testing

Objective

To familiarize technicians or participants in Solar Panel.

Program Profile

- PV System Configuration .
- Site Selection.
- Module Selection.
- Selection & Inverter.
- Generator Junction Box & DC Main Switch.
- Safety Measures - Mounting System.
- Grid Interface.

Venue	Duration	Date
Neyveli	1 Week	14-09-2020
	03 Days	08-06-2020 24-06-2020
Shivpuri	1 Week	21-09-2020

Who may attend : Technician/Diploma/Degree holders.

4.5.19 Hybrid Renewable Energy Systems (HRES)

Objective

With the advent of Renewable Energy in a big way Hybrid systems are required for reliable and economical energy.

Program Profile

- Integral components of Hybrid renewable energy system and its configuration.
- Optimization modeling of hybrid renewable energy system
- Sustainability and reliability of HRES.
- Economic energy storage solution of HRES.
- Cost economics of HRES .
- Constructional and operation challenges of HRES system.

Venue	Duration	Date
Faridabad	02 Days	11-12-2020
Shivpuri	03 Days	27-07-2020

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.5.20 Hybrid Renewable Energy Systems

Objective

To familiarize and train the utility Engineers and Researchers regarding. Various hybrid renewable energy technologies for power generation.

Program Profile

- Hybrid Re policy 2018, Incentives Regulatory issues.
- Wind-Solar Hybrid : AC integration.
- Wind-Solar : DC integration.
- Bio Mass-Solar Hybrid System.
- Bio Mass-Wind Hybrid system.
- Deployment of Hybrid RE Systems in Mini Grid.
- Battery Electric Storage System (BESS).

Venue	Duration	Date
Neyveli	03 Days	27-07-2020

Who May attend : Engineers/Faculties/ Research Scholars/ PG students.

4.5.21 Renewable Energy Grid Interface Technology & Regulatory Framework

Objective

The objective of the program is to understand the characteristics of Renewable Energy generation including fundamentals, applications, commercial aspects, Grid Interface challenges and regulatory provisions of different Renewable Energy Technologies i.e. Wind, Solar, Small Hydro and Bio-Energy, including the Regulatory Framework.

Program Profile

- Basics of RE Technologies, Manufacturing Capacity and R & D status.
- Government Initiatives & support for RE Generation Installations.
- Key Challenges for Implementation of RE with Case Studies.
- RE Grid Integration challenges & possible measures.
- Grid Integration system & Power Grid Analysis and studies
- Technological aspects of power electronic system connected to Grid.

- Active Network devices, control and FACTS technology related to RE Grid Interface.
- Regulatory Infrastructure for RE generation in India.
- Challenges in RE Regulatory provisions with Conventional Generation.

Venue	Duration	Date
Faridabad	02 Days	Mutually Agreed
Shivpuri	03 Days	13-05-2020

Who may attend : Power Sector Professionals from Industry, Institutions, R&D Centers, Manufacturing firms, Consultants, Developers and all Engineering & Science graduates.

4.5.22 Design and Verification of Electrical Installations

Objective

To develop the essential, up-to-date knowledge and techniques needed to professionally design and install or inspect and test electrical systems. The ability to design is required before new installations are constructed and also when additions or alterations to existing installations are required. This may be ideal for qualified electricians wishing to expand or update their professional knowledge and skills and who are working with minimal or no supervision. It can be intended for personnel in electrical contracting companies who have responsibility for the quality of the design, specification, installation and testing process.

Programme Profile

- Theory and Practical sessions and examples of how electrical installations should be designed are to be incorporated to this proposed Course. The course should consist of design exercises for the candidates to carry out, which evaluate and explore the process of design in terms of general characteristics, protection for safety, selection, erection and testing.
- Awareness on Electrical Safety and Related Statutory Provisions with exposure through State/Central Inspectorate of Electricity.
- Overview on "The Central Electricity Authority (Measures Relating to Safety & Electric Supply) Regulations, 2010".

Venue	Duration	Date
Guwahati	1 Week	Mutually Agreed

Who may attend : This may be ideal for qualified Electricians wishing to expand or update their professional knowledge and skills and who are working with minimal or no supervision. It can be intended for Personnel in electrical contracting companies who have responsibility for the quality of the design, specification, installation and testing processes.

4.5.23 Development of Intelligent Power Monitoring System for Reliable Operational Strategy in Upcoming Evolving Dynamical Market

Program Profile

- Traditional Power Flow Controllers, Concept of SCADA and DCS and IoT based Control Strategy.
- Traditional Grid Constraints, Evolving Micro Grid Model and Smart Grid Technologies in Up Coming Large Renewable Energy.
- Smart Grid Components, Planning of Smart Power Flow Controllers & PMUs in Intelligent Environment for Reliable System Operation.
- Advanced Metering Interface (AMI), Sub Station Communications Protocols in Decentralized Framework.
- GIS & Asset Management: Analytical Approach.
- Methodology of Smart Generation, Smart Transmission & Smart Distribution.

Venue	Duration	Date
Alapuzza	03 Days	24-06-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.

4.5.24 Design, Operation, Economic Evaluation of Floating Solar and Wind Integration in existing Hydro Plants and Sub-Station/ Planning of Sub-Station up Gradation

Program Profile

- Feasibility study of Floating Solar system and Wind Farms in Hydro Generation.
- Design, O & M of Floating Solar and Wind Energy systems.
- Economic Evaluation of Floating Solar systems and Wind Energy System.
- RE Grid Penetration Issues, Challenges and Technology Solutions.
- Solar and Wind Energy Integration in existing Sub-Station.
- Up-Gradation of existing sub-station/Infrastructure for Floating Solar and Wind Energy System.

Venue Shivpuri **Duration** 03 Days **Date** 22-07-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.

4.5.25 Determination of Strategic Power Controllers : Design and Analysis with optimal locations in Hybrid Mix Energy Era

Program Profile

- System Planning with Strategic Power Controllers, Application of FACTS Controllers in a Hybrid Energy Systems.
- Governing Factors of Hybrid Energy System's Reliability and Advance Technology Solutions.
- Existing Control Methodology in Hybrid Energy Systems: Analytical Assessment.
- Intelligent Control Concepts for Hybrid Energy Systems.
- Smart Power Flow Controllers for Hybrid Energy Systems: Layered Architecture.
- Smart Controllers in Hybrid Energy Systems: Performance Evaluation.

Venue Alapuzzaha **Duration** 03 Days **Date** 26-08-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.

4.5.26 Grid Integration of Hybrid Generation: Review of existing Sub-Station Controls required for upcoming RE Mix in Switchyard and handling Intermittency with Grid and Energy Storage options

Program Profile

- Hybrid Generation Fundamentals and Challenges, Concepts of Grid Interface Technologies.
- Review of existing substation for Interconnection with upcoming RE Generation: Analytical Approach.
- Energy Balancing Mechanism and Scheduling of RE System with Adequate Controls for RE Interconnection in existing Switchyard.
- Hybrid Generation Era Grid Codes: Technical Standards and handling of Intermittency in Integrated Large Grid.
- Evolving Energy Storage Technologies (Pumped Storage, Battery Storage Technologies, Thermal Storage and Flywheels).
- Renewable Energy Regulation in Energy Market :Technology Options for Effective Open Access.

Venue Alapuzzaha **Duration** 03 Days **Date** 14-10-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.

4.5.27 Assessment of existing Transmission corridor/ Infrastructure feasibility for evacuating additional 100% power over & above the existing Hydro power with upcoming RE.

Program Profile

- Grid Code and Technical Standards with reference to RE Generation, Transmission and Distribution.
- Transmission System Planning- Up Gradation in Open Access, Feasibility Studies Infrastructure.
- Deviation Settlement Mechanism & Congestion Settlement Mechanism in Dynamic Power Market.
- Tariff Determination Methodology, CERC Tariff Guidelines and Determination of Tariff for Hybrid Energy Projects.
- Concept of ATC, TTC & Ancillary Services in Large Renewable Energy Era.
- Hands on practice using MS-Excel for Tariff determination.

Venue Shivpuri **Duration** 03 Days **Date** 16-12-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.



Inauguration function – PGCIL AETS, Sh.G. M. Das former CE AEGCL, Sh. D. Sarma former ED PGCIL NERTS, National Power Training Institute, North Eastern Region, Guwahati

4.6 TRANSMISSION AND DISTRIBUTION SYSTEM

4.6.1 Power System Studies

Objective

To familiarize the power system engineers with modeling of power system components and the power system studies software for power flow studies, short circuit studies, stability studies and relay coordination.

Outline

- Load flow: Modeling and case studies.
- Short circuit studies; Z bus matrix and symmetrical components.
- Balanced and unbalanced faults and case studies.
- Over current relay coordination-case studies.
- Stability studies-modeling case studies.
- Laboratory : Use of MiPower software.
- Field visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	22-04-2020

Who may attend : Transmission and distribution engineers involved in system design, planning, protection and control, engineers from R & D organizations and Academic institution.

4.6.2 Power System Studies & Load Despatch

Objective

To acquaint the participants with the various aspect of Pumps and the associated problems in their O&M.

Program Profile

- Growth of power system in India.
- Representation of power system components.
- Characteristics & performance of power transmission lines.
- Load flow studies and problems.
- Different types of faults and their analysis by computer methods.
- Power system protection devices.
- Power system stability.
- Load Despatch and its computerization.

Venue	Duration	Date
Neyveli	03 Days	15-04-2020

Who may attend : Engineers of Power Sector engaged in power system and load dispatch centres.

4.6.3 Flexible AC Transmission System (FACTS)

Objective

To familiarize power engineers about the Flexible AC Transmission devices and their applications in power systems with respect to active/reactive power control.

Outline

- Introduction.
- Thyristor Controlled FACTS devices - Static Var Compensator (SVC), Thyristor Controlled Series Capacitor (TCSC), Thyristor Controlled Reactor (TCR).
- Phase Shifting Transformer.
- Voltage Source Converter based FACTS controllers- STATCOM, Static Synchronous Series Compensator (SSSC), Unified Power Flow Controller (UPFC).
- HVDC.
- Applications of FACTS.
- Tutorials.
- Technical Visits.

Venue	Duration	Date
Badarpur	1 Week	23-11-2020
Shivpuri	03 Days	06-01-2021

Who may attend : Practicing engineers involved in planning, design and implementation of FACTS devices.

4.6.4 Power System & Load Despatch

Objective

To make participants understand the function and responsibilities of load dispatch centre.

Program Profile

- Growth of power system in India.
- Objectives & functions of LD Centre.
- Organization of LD Centre
- Reactive power management.
- Power quality.
- Computerization of load dispatch.

Venue	Duration	Date
Nagpur	03 Days	23-09-2020

Who may attend: Engineers engaged in power sector and local load dispatch centre.

4.6.5 HVDC Transmission Systems

Objective

To familiarize the engineers with the HVDC technology and its importance in system operation.

Program Profile

- Introduction to HVDC.
- Principles of HVDC Conversion.
- HVDC Lines.
- HVDC Sub Stations.
- Reactive Power Management in HVDC Stations.
- AC & DC harmonics and filtering.
- HVDC System operation, Insulation Coordination, Emergencies and case studies.
- HVDC System operation Control and maintenance
- Field Visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	07-10-2020
Shivpuri	02 Days	14-09-2020

Who may attend : Practicing engineers from generation, transmission, distributed systems, industrial and other consumers of electricity, electrical inspectors and electrical consultants.

4.6.6 Operation & Maintenance (O&M) of Transmission Lines & Sub-station

Objective

To update knowledge of the participants in various operational & Maintenance aspects of Transmission line & Sub-Station.

Program Profile

- Transmission and Distribution - a business mission.
- Operation Procedures and practices of Transmission line and Sub-Station.
- Equipment inspection and Selection aspects.
- Equipment Failure analysis and its maintenance.
- Maintenance of Sub-Station equipments.
- Hot line Maintenance and ERS of Transmission line.
- Routine, Preventive and breakdown Maintenance.
- Protection System and its equipment.
- Safety aspects and fire protection devices.

Venue	Duration	Date
Alapuzza	1 Week	15-06-2020
Durgapur	1 Week	06-07-2020

Who may attend : Engineers with minimum 2-3 years experience in O&M of Transmission and Distribution or Power Station.

4.6.7 Operation & Maintenance (O&M) of HT/LT Switchgear

Objective

The main objective of the course is to update the Knowledge of plant engineers in the field of switch gear and its erection testing/ commissioning, operation and maintenance.

Program Profile

- Types of Switchgears.
- Selection Criteria for Switchgears.
- Design & Construction Data.
- Erection/Commissioning.
- Check-list and precautions.
- Fault finding.
- Testing procedures & Equipments.

- Case Studies.

Venue	Duration	Date
NPTI-NER Guwahati	1 Week	07-09-2020

Who may attend : Engineers with 2-3 years experience in switchgear electrical installation of industry.

4.6.8 High Voltage Testing of Power System Equipment

Objective

To give insight into all the facets of High Voltage Testing of Power system equipment.

Outline

- High voltage technology.
- Solid insulating media, liquid insulation media.
- Gas & Vacuum Insulation.
- Generation of high voltage for testing.
- High voltage measurements.
- High voltage testing of transformers.
- Testing of Circuit Breakers.
- Testing of Surge arrestors.
- Testing of Insulators, Cables, Capacitors.
- High Power Testing of switchgear.
- Partial Discharges.
- Field visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	09-02-2021

Who may attend : Engineers involved in procurement, installation and testing of power system equipments.

4.6.9 Operation & Maintenance (O&M) HVDC Transmission Systems

Objective

To familiarize power engineers & technicians in the area of HVAC transmission systems.

Program Profile

Performance improvement of HVAC Transmission Systems depends on various factors like voltage rating, area location, type of tower, loading, design and technology of various hardware. It also depends on methods of monitoring and maintenance technique used.

Description

- Various issues & challenges in Transmission systems.
- Types of Tower, various hardware & fittings.
- Methods of Monitoring.
- Types of faults & causes.
- Thermo-scanning, etc.
- Improved Transmission Monitoring (WAMS) using PMU/PDCs.
- Better coordination between transmission and distribution (Grid Discipline).
- Maintenance of transmission line.
- Live/hot line insulator cleaning and replacement.
- FACTS devices.
- Methods of reduction of AT & C losses.

Venue	Duration	Date
Nagpur	01 Week	17-08-2020

Who may attend : Engineers, Technicians & personal working in Transmission & distribution utilities.

4.6.10 Power System Energy Losses

Objective

To acquaint the participants with the sources of power system losses in transmission and distribution network and possible remedies.

Program Profile

- Growth of power system in India.
- Transmission Losses.
- Distribution losses/transformer losses.
- HT metering.
- Remedial measures to minimize various system losses.

- Energy management system, Flattening of load demand, Energy auditing and reporting techniques.
- Power System Planning, economic operation, maintenance to minimize losses.
- Computer application in Power System.

Venue	Duration	Date
Neyveli	03 Days	02-09-2020
Shivpuri	03 Days	02-09-2020

Who may attend : Assistant Engineers/ Executive Engineers/ Superintending Engineers working in transmission & distribution.

4.6.11 Smart Transmission & Distribution System Objectives

To familiarize power engineers in the area of Smart Grid & its application.

Programme Profile

It consist of various parameters of smart grid implementation such as economy, design technology options, reliability, quality & pay-back period. It includes various policies for advanced metering infrastructure (AMI) and AMI projects in India.

Outline

- Requirements for AMI infrastructures.
- Working of Advanced Metering Infrastructure (AMI).
- Metering Demand.
- Meter Data Management Systems (MDMS).
- Virtual and Aggregated Net Metering.
- Response (DR), including Virtual Power Plants (VPPs).
- Monitoring (WAMS) using PMU/PDCs.

Venue	Duration	Date
Alapuzhaha	01 Week	06-06-2020
Nagpur	01 Week	13-04-2020

Who may attend : Engineers, Technicians & personal working in Transmission & distribution utilities.

4.6.12 Project Management of EHV Lines & Towers including Sub - Station

Objective

To make participants aware about the planning, estimating & execution of a Transmission Line. Project work and to impart the knowledge about the best practices.

Program Profile

- Project management Techniques for Transmission Line Projects.
- Software methods for Project preparation and control etc.
- Financial Implications of Project Management.
- Site Survey, detailed survey, Foundation work etc.
- Estimation of EHV Lines work, Sub-Station etc.
- Construction of EHV Lines and Tower and Sub-Station
- Commissioning of Lines and Sub-Station etc.
- Sub-Station visit.

Venue	Duration	Date
Nagpur	1 Week	14-12-2020

Who may attend : AE, Dy. EE, EE of Transmission Utility & Project Personnel from Contractor Company.

4.6.13 Distribution Engineering

Objective

To familiarize the participants with various aspects of electricity distribution engineering.

Programme Profile

Growth, Development, Equipment, Standards specification, construction Practice and guidelines, design aspects-testing and installation of Distribution equipment - Layout of Sub-Station.

Venue	Duration	Date
NPTI-NER Guwahati	01 Week	01-03-2021

Who may attend : Engineers engaged in distribution of electricity with 2-3 years experience.

4.6.14 Distribution Automation

Objective

To familiarise the participants with the low voltage power distribution system design including selection and sizing of cables, switchgear, control panels and safety requirements.

Program Profile

- Design of LT Distribution System.
- LT distribution System - Feeder Reconfiguration and Transformers Load balancing.
- Customer Site Automation function: Load Control.
- Remote Meter Reading.
- Time-of-use rates.
- DTS Lab Voltage/ Var Control using Capacitors.
- Regulators.
- LTC.
- Equipment for Feeder Automation and Customer Automation.
- Digital Protection of Substation and feeders
- Remote connect/ disconnect.
- System Level Function: Fault Location.
- Isolation and service restoration.

Venue	Duration	Date
PSTI Bengaluru	03 Days	05-08-2020

Who may attend : Engineers engaged in distribution of electricity with 2-3 years experience.

4.6.15 Transformers

Objective

To acquaint the participants with various problems faced in transformer failures, prediction failure analysis with case studies.

Program Profile

- Standardization & Specifications of transformers used in Power station.
- Selection of transformer, protection & schemes of protection and testing.
- Types & causes of Transformer failures.
- Testing of solid dielectric.
- Testing of liquid dielectric, standards.
- Predictive maintenance of failures.
- Dissolved gas analysis techniques.
- Case studies on transformer breakdown.
- Drying of Transformers.

Venue	Duration	Date
Neyveli	03 Days	06-01-2021

Who may attend : Engineers with 3-4 years experience in the relevant field.

4.6.16 Condition Monitoring Residual Life Assessment (RLA) & LE of Substation Equipment

Objective

To familiarize the power engineers with Residual Life Assessment (RLA) & LE of Substation Equipment.

Outline

- RLA – Objective and Methods.
- Testing procedures and Methodologies.
- RLA of Oil filled transformers.
- RLA of Instrument Transformers.
- RLA of circuit breakers.
- RLA of other sub station switchgear.
- RLA of power cables.
- Testing and calibration of substation meters.
- Field Visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	24-02-2021

Who may attend : Engineers from State Electricity Boards, Power Utilities/Corporations, R & D organizations, Academic institutions.

4.6.17 Substation Planning & Engineering

Objective

To familiarize participants with the planning layout, design & engineering of Substation and selection of Substation equipment.

Program Profile

- Planning of substation & Preparation of Project Report.
- Layout of Substation, Choice of Switching Schemes and Bus Bar/Bay Design.
- Selection of Substation Main Equipment.
- Design Consideration of Substation Equipment and Earthing.
- Electrical Clearances and pre-commissioning Inspection.
- Over Voltages & Selection of Surge Arrestors.
- Engineering of Protection System for Substation.
- Cost estimates of Sub-Station and Case Study.
- Measurement of Soil Resistivity.
- RPC System.
- Metering in Sub-Station.
- Sub-Station Automation.
- Case Study.
- Field Visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	01-04-2020 20-01-2021

Who may attend : Engineers from State Electricity Boards, Power Utilities/ Corporations, R & D organizations, Academic institutions

4.6.18 Power System Protection

Objective

To familiarize the power engineers with protection in power systems.

Outline

- Fault analysis.
- Relay input sources.
- Protection of Generators & motors.
- Protection of bus bars.
- Protection of Transformers.
- Protection of EHV lines.
- Protection of Distribution systems.
- Protection against over voltages.
- Insulation Co-ordination.
- Testing of Surge Arrestors.
- Testing & commissioning of relays.
- Present trends in protection
- Case Studies.
- Laboratory Sessions.
- Tutorials.
- Field visits.

Venue	Duration	Date
Alapuzhaha	02 Weeks	13-07-2020
PSTI Bengaluru	02 Weeks	08-06-2020

Who may attend : Engineers from state Electricity Boards, Power Utilities/ Corporations, R & D organizations, Academic institutions.

4.6.19 Advanced Power System Protection

Objective

To familiarize the power engineers on the advanced aspects of protection in power systems.

Outline

- Overview of System Protection.
- Numerical Relays.
- Protection of Transformers, Transmission lines, Bus bars, Feeders.
- Integrated Protection, Control & Monitoring.
- Intelligent electronic Devices in System Protection.
- Software architecture and performance characteristics of numerical relays.
- Wide Area Protection.
- Video Sessions.
- Field Visits.

Venue	Duration	Date
Alapuzhaha	01 Week	20-07-2020
PSTI Bengaluru	01 Week	15-06-2020

Who may attend : Engineers from State Electricity Boards, Power Utilities/ Corporations, R & D organizations, Academic institutions.

4.6.20 Electrical Protection System

Objective

To enhance the knowledge of in-service engineers involved in commissioning & maintenance of protective relays both in Generation and Transmission wings.

Program Profile

- Requirement of protective system (criteria for selection & choice of protection scheme).
- Instrument transformers, system grounding, fault parameters, fault analysis, sequential recorder & disturbance recorders.
- Generator protection (This topic will be covered in detail with special reference to 210 MW & 500 MW generators).
- Transformers and Bus-bar protection schemes, Transmission line protection (principles of relaying and commissioning).

Venue	Duration	Date
Badarpur	01 Week	04-01-2021
Neyveli	03 Days	15-07-2020
Durgapur	01 Week	08-06-2020
Nagpur	04 Days	08-09-2020
Shivpuri	01 Week	13-04-2020

Who may attend: In-service Power Station Engineers having 2-3 years experience in the relevant field.

4.6.21 Relay Maintenance

Objective

To make the technicians understand and identify various types of relays, their applications, maintenance and calibration requirements.

Program Profile

- Basic protection requirements.
- Basic relay terminology.
- Different types of relays.
- Fault discrimination methods.
- Relay characteristics and setting, testing etc.

Venue	Duration	Date
Neyveli	03 Days	26-08-2020
Shivpuri	03 Days	26-08-2020

Who may attend: Technicians having 2-3 years experience in the relevant field.

4.6.22 Electrical Protection System - Numerical Relay

Objective

To familiarize the power engineers on the advanced aspects of protection in power systems.

Program Profile

- Protection Systems- Basic Concepts, Fundamental Requirements, Types, Selection and Settings.
- Generator Protection.
- Transformer Protection.
- Bus Bar & LBB.
- Transmission Line Protection.

Venue	Duration	Date
Durgapur	02 Days	29-06-2020
Shivpuri	03 Days	08-09-2020 10-03-2021

Who may attend : Engineers from State Electricity Boards, Power Utilities/ Corporations, R & D organizations, Academic institutions.

4.6.23 Protection Philosophy, Interlock and Relays Integration

Objective

To brief the participants about basics of protection and interlocks of protection.

Program Profile

- Protection Requirement and relays basics.
- Circuit Breakers.

- Various Types of Relays.
- Switchgear.
- Protection, Transmission line protection etc.
- Protection Interlocks and its procedure.
- Feedback Session.

Venue	Duration	Date
Durgapur	02 Days	04-06-2020

Who may attend : Experienced and fresh Diploma and Graduate Engineers.

4.6.24 Dynamic Operation of Transformer and Control

Objective

Transformer loading pattern is changing day by day and its requires lots of care of transformer during the operation. Dynamic operation of transformer leads to big challenges for utility and requires lots of attention on the same. Some of the major outlines of the same are given below.

Program Profile

- Detection and disconnection of transformer for internal faults.
- Detection of peak inrush currents (RUSH) without disconnection.
- Faulty tripping due to incorrectly sized transformers.
- Selection of tripping characteristics with differential currents.
- Setting the parameters of a time over current relay taking the.
- Detection of operating values for symmetrical and asymmetrical faults.
- False tripping of the protective device during the transformer switch-on response Transformer switch- on response in terms of protection.

Venue	Duration	Date
PSTI Bengaluru	02 Days	Mutually Agreed
Nagpur	02 Days	Mutually Agreed

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.6.25 Best Practices in Distribution Operation & Management

Objective

The objective of this course is to introduce the Junior and Workman Level Employees of the Distribution Utilities to the role and application of equipment like Distribution Transformer, CT/PT, Capacitor, Energy Meters, cables, Surge Arresters, Switchgears and Insulators, etc. In Distribution Business. Design, selection, specifications of Distribution Equipment's; Testing & Quality control, Erection & Commissioning of Distribution equipment's; Operation & maintenance, Corrective & Preventive Maintenance, failure analysis etc., Learning about pre implementation issues, Implementation issues, and post implementation issues.

Program Profile

- Distribution Transformer: Types of Transformers and functions, Specification and Selection of DTs, Design and Performance Characteristics, Testing, Quality Control, Erection and Commissioning, Operation and Maintenance.
- Instrument Transformers: Design of CVTs (Capacitor Voltage Transformers), IVTs (Inductive Voltage Transformers), CTs, Insulation design, Quality concepts, Quality checks, Tests, Erection and Commissioning, Failure analysis.
- Insulators: Types of Insulators, Components, Testing's (Mechanical, Electrical, Thermal and Other tests), Insulator Selection, Handling Installations and Trouble Shootings.
- Surge Arresters: Concepts of Metal oxide Arresters, Polymer arresters, Zinc oxide arresters, Application of Surge arresters up to 420kV, Testing aspects, Arresters for transmission line protection, Pollution behavioral aspects of metal oxide arresters.
- Electrical Cables: Manufacturing process, Design of Conductors, Insulations, Armouring, Outer Sheeting, Quality, Cable laying and Installation, Electrical Stress, Generalized Installation.
- Capacitors: Reactive power control, Reactive power management, Definition and origin of low power factors, Types of power factors, Effect of harmonics. Installation of APFC panel,

Testing and Quality control, VAR support and power factor correction.

- Switch Gears and Control-Gears.
- Energy Meter: Metering Applications and Key Features, Installation Audits Requirements Field Testing Requirement, Growing meters technology, Revenue Protection, Regulatory requirements, Remote meter readings, prepayment technology, Load managements.
- Latest trends in Distribution Equipment and International Practices.
- Field Visit - Sub-Station Visit.

Venue	Duration	Date
Badarpur	01 Week	Mutually Agreed
Guwahati	01 Week	Mutually Agreed
PSTI Bengaluru	01 Week	Mutually Agreed
Nagpur	01 Week	Mutually Agreed

Who may attend : Junior Engineer, Workmen, Technicians.

4.6.26 Operation & Maintenance (O&M) of Transformers and Circuit Breakers

Objective

To give insight into various aspects on operation, maintenance, testing and condition monitoring of transformers and circuit breakers.

Outline

- Transformers-Construction, connections.
- Tap Changing Mechanism & Parallel Operation.
- Selection and sizing of Transformer, Transformer Neutral Earthing and Substation.
- Earthing Practices.
- Testing of Transformers.
- Condition Monitoring of Transformers.
- Protection of Transformers.
- Maintenance of Transformers.
- Application and Design of Air and Gas Insulated Circuit Breakers
- Selection, Sizing, Performance Analysis of Circuit Breakers
- O&M of Circuit Breakers.
- Testing and Condition Monitoring of Circuit Breakers.
- Testing of Circuit Breakers.
- Field visits.

Venue	Duration	Date
Badarpur	01 Week	05-10-2020

Who may attend: Engineers from state Electricity Boards, Power Utilities/ Corporations, R & D organizations, Academic institutions.

4.6.27 Operation & Maintenance (O&M) of Distribution system

Objective

To familiarize power engineers & technicians in the area of power distribution Systems.

Program Profile

Performance improvement of power distribution systems depends on various factors like voltage rating, area location, method of power distribution, loading, design and technology of various hardware. It also depends on methods of monitoring, metering and maintenance technique used.

Description

- Various issues & challenges in Distributions management systems.
- Types of poles, various hardware & fittings.
- Methods of Monitoring.
- Metering.
- Maintenance of distribution line.
- Advanced Distribution Operations.
- Integration with R-APDRP systems.
- Advanced Metering Infrastructure (AMI).
- Better coordination between transmission and distribution (Grid Discipline).
- Types of faults & causes.
- Maintenance of distribution lines.
- Methods of reduction of AT & C losses.

Venue	Duration	Date
Alapuzzaha	01 Week	03-08-2020
Nagpur	01 Week	02-11-2020

Who may attend : Engineers, Technicians & personal working in Transmission & distribution utilities.

4.6.28 Operation & Maintenance of EHV Sub-station

Objective

To impart knowledge to the trainees about the installation, commissioning, operation and maintenance of Sub-Station.

Program Profile

- Introduction to sub-station.
- Types of layout etc.
- Soil testing and site selection.
- Equipment inspection & selection aspects.
- Civil foundation for main equipments, tower, ground work.
- Structure and tower erection and fabrication alignment.
- Earthing, cable trench, cable tray.
- Protection system & its equipment.
- Design and erection.
- Switchyard HV equipments erection.
- Switchyard, compressor, lightning arrestors.
- Different safety aspects, fire protection devices, erection and commissioning.

Venue	Duration	Date
Alapuzzaha	02 Week	17-08-2020

Who may attend : Engineers with 2-3 years experience in electrical operation and maintenance of Power Station and transmission & Distribution.

4.6.29 Transmission & Distribution Equipment Maintenance

Objective

To improve the skill of personnel engaged in the field of Transmission & Distribution equipment maintenance.

Program Profile

- Transmission and distribution system familiarisation.
- Maintenance involved during erection and commissioning of T&D equipment.
- Transmission and distribution system and equipment maintenance procedure.
- Preventive and predictive maintenance program & schedule.

Venue	Duration	Date
Alapuzzaha	01 Week	07-09-2020

Who may attend : Maintenance technicians with 2-3 years experience in the field.

4.6.30 Distribution Transformers Failure - Trends in O&M

Objective

To familiarize the failures and trends in O&M of Transformer Distribution Engineers.

Outline

- Design and Manufacturing of Distribution Transformers,
- Erection, Testing and Commissioning of Distribution Transformers.
- Transformer Oil characteristics.
- Filtration and Reclamation Techniques.
- Maintenance of Distribution Transformers.
- Field Visits

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	20-05-2020

Who may attend : Engineers from State Electricity Boards power Utilities/ corporation. Industrial Manufacturer dealers in transformers.

4.6.31 Operation & Maintenance (O&M) of Transformer

Objective

To update the knowledge of Plant technicians in the field of Transformers and its erection, Testing/Commissioning, Operation and maintenance.

Program Profile

- Standardization and Specification of Transformers used in the Power station.
- Commissioning of Transformers.
- Types and Causes of Transformer failure.
- Testing of Solid dielectric.
- Transformer Oil-Its analysis, sampling and testing procedure.
- Transformer Maintenance Practices.
- Dissolved gas Analysis Techniques.
- Case Studies.

Venue	Duration	Date
Guwahati	01 Week	01-02-2021

Who may attend : This course is meant for operation and Maintenance Technicians with 2-3 years experience in relevant field.

4.6.32 Switchgear Maintenance

Objective

To update knowledge of plant technicians in the field of switchgear and its erection, testing/commissioning, operation and maintenance.

Program Profile

- Introduction to circuit breakers, Arc formation, Arc quenching etc. Constructional details of different types and makes of circuit breakers like air circuit breakers, minimum oil circuit breakers, air blast circuit breakers, vacuum circuit breakers, SF6 breakers etc.
- Selection Criteria for switchgear.
- Design & Construction Data.
- Erection/Commissioning.
- Check-list and precautions.
- Maintenance & Testing procedures & Equipments.
- Case studies.

Venue	Duration	Date
Neyveli	02 Days	23-04-2020
Shivpuri	02 Days	23-04-2020

Who may attend : This course is meant for maintenance technicians with 2-3 years experience in Switchgear maintenance.

4.6.33 Transformer Maintenance

Objective

To update knowledge of plant technicians in the field of Transformers and its erection, testing/commissioning, operation and maintenance.

Program Profile

- Standardization & specifications of transformers used in Power Station.
- Selection of transformer, erection/ commissioning.
- Testing & causes of Transformers failures.
- Testing of solid dielectric.
- Insulating oil, identification, sampling and testing procedures.
- Transformers maintenance procedures.
- Dissolved gas analysis techniques.
- Case studies.
- Drying of Transformer.

Venue	Duration	Date
Neyveli	03 Days	16-12-2020
Durgapur	02 Days	29-09-2020
Shivpuri	03 Days	21-12-2020

Who may attend : This course is meant for maintenance technicians with 2-3 years experience in Transformer maintenance.

4.6.34 Best Practices in Operation & Maintenance (O&M) of Distribution Transformers Leading to Zero Breakdown

Objectives

To discuss maintenance aspects of power and distribution transformers.

Outline

- State of the art of Transformers.
- Tests to check the adequacy of Transformers.
- Insulation co-ordination of Transformers.
- Earthing, Loading, Maintenance & protection of Transformers.
- Failure, Failure analysis & condition monitoring of Transformers.
- Condition Monitoring of Transformer Oil.
- Diagnostic Monitoring by DGA with case histories.
- RLA of Paper Insulation by Furan analysis.
- Field visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	02-09-2020

Who may attend: Engineers involved in the Operation, Maintenance and Testing of Transformer from state Electricity Boards, Power Utilities, R & D organizations, Academic Institutions, Transformer manufactures transformer Oil processors and servicing organizations etc.

4.6.35 Operation and Maintenance (O&M) of Sub-Station

(a) Location: Guwahati

Objective

To impart knowledge to the trainees about installation, commissioning, operation and maintenance of substations.

Program Profile

- Introduction to Substation.
- Types of Substation, Layout etc.
- Selection of Equipments and inspection Procedures.
- Civil foundation for main equipments, tower, grounds work etc.
- Earthing, cable trench and cable tray.
- Transformers, isolators specification & their characteristics.
- Safety aspects of Substations & Equipment Protection.
- Switchyard compressors, lightning arrester DC supply system.
- General practices of EHV/HV/LV substation operation & maintenance.

Venue	Duration	Date
Guwahati	01 Week	08-06-2020 16-11-2020

Who may attend : Engineers with 2-3 years of experience in operation and maintenance of substations.

(b) Location: Nagpur

Objective

To familiarize power engineers & technicians in power Substation Systems.

Programme Profile

Performance improvement of power Transmission & distribution depends on healthiness of substation & various equipments in substation. Performance of substation depends on various equipments like Transformer, C.B, relays, C.T. & P.T. Lightning Arrestors, Neutral earthing. Substation equipments condition monitoring techniques & testing decides the maintenance to be scheduled.

Description

- Switchyard Operating Procedures.
- Equipments in Switchyard & their functions.
- Methods of Monitoring /Thermo-scanning, etc.
- Types of faults in substation.
- Methods of Inspection. Testing & Monitoring of various Switchyard equipments & its schedule.
- Procedures of substation & line maintenance.
- Methods of substation Maintenance.
- GIS, Substation.
- Substation Automation.

Venue	Duration	Date
Nagpur	01 Week	04-01-2021

Who may attend : Engineers, Technicians & personal working in Transmission & distribution utilities.

4.6.36 O&M, Testing of Power Transformers and HT Circuit Breakers

Objective

To give insight into various aspects on operation, maintenance testing & condition monitoring of power transformers & HT circuit breakers.

Outline

- Transformers- construction, connections.
- Tap changing mechanism & parallel operation.
- Selection & sizing of transformers, transformer neutral earthing & substation earthing practices.
- Testing of transformers.
- Condition monitoring of transformers.
- Protection of Transformers.
- Application & design of Air & Gas Insulated circuit breakers.
- Selection & sizing, performance analysis of circuit breakers.
- O&M testing, condition monitoring of circuit breakers.
- Fields Visits.

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	25-11-2020

Who may attend : Industrial/other consumer of electricity, electrical inspectors/assisting officers, utility representatives, manufacturers/dealers of electrical equipment/power cables/LT/HT switchgear.

4.6.37 Switchgear and Transformer Maintenance

(a) Location: PSTI Bengaluru

Objective

To familiarise the power engineers with Switchgear and Transformer Maintenance.

Outline

- Introduction of circuit breakers, Arc formation, Arc quenching etc.
- Constructional details of different types and makes of circuit breakers like air circuit breakers, minimum oil circuit breakers air blast circuit breakers, vacuum circuit breakers, SF6 breakers etc.
- Insulating oil, identification sampling and testing procedures.
- Oil Testing details for crackle testing break down testing oil filtration.
- Reading of schemes, control and wiring diagrams.
- Transformers construction details.
- Transformers maintenance procedures.

Methodology

Lecture, Demonstrations, Tutorials, Laboratory work, Fields, visits Video sessions Group Discussions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	03-03-2021
Shivpuri	02 Days	23-04-2020

Who may attend : Engineers from State Electricity Boards, Power Utilities/Corporations, R&D organisations, Academic institutions.

(b) Location: Durgapur

Objective

To enable the participants to carry out maintenance of different types of circuit breakers and transformers by using correct procedures and tools. After completion of the course the participants will be able to take up the repairs and routine maintenance of switchgears and transformers independently.

Program Profile

- Introduction to circuit breakers, Arc formation, Arc quenching etc.
- Constructional details of different types and makes of circuit breakers like air circuit breakers, minimum.

oil circuit breakers, air blast circuit breakers, vacuum circuit breakers, SF6 breakers etc.

- Insulating oil, identification, sampling and testing procedures.
- Oil Testing details for Crackle Testing, Break down testing, Oil filtration.
- Reading of schemes, control and wiring diagrams.
- Transformer construction details.
- Transformer maintenance procedures.

Venue	Duration	Date
Durgapur	01 Week	20-04-2020

Who may attend : This course is meant for maintenance technicians with 2-3 years experience in Switchgear and Transformer maintenance.

4.6.38 Power Quality, Harmonics Mitigation and Reactive Power Management

Objective

To familiarise the power engineer regarding the power quality and causes, consequences and cures to harmonics in electrical systems/industry.

Program Profile

- Introduction to power quality.
- Power Quality – impacts, manifestations.
- Consequences of power quality.
- Power quality measurement.
- Harmonics – sources, measurements and mitigation.
- Filters – Active and passive filters, selection of filters.
- Statcoms, custom power devices, Static Var Compensators.
- Reactive Power Control Equipment.
- Performance of Reactive Power Equipment under different Operating Conditions.
- Comparative Study of AVR's, OLTC's, Power Capacitors, Shunt Reactors, SVC's, TCR's, Statcoms etc, in reactive power management.
- Automatic Power factor controllers.
- Harmonics – causes, measurement and mitigation.
- Thyristor based and voltage source converter based FACTS Controllers.
- Case Studies.
- Technical Visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	23-09-2020

Who may attend : Practicing Engineers/ supervisors of industry, Utilities and faculty of educational institutions involved in maintenance of power quality and mitigation of harmonics.

4.6.39 Power Quality Measurement

Objective

Power quality and reliability with respect to modern grid a big challenge and its requires lot of engineering challenge as well as research. Integration of different energy resources with the new grid is required power quality monitoring and measurement. Some of the highlights are given below.

Program Profile

- Importance of Power Quality.
- Index parameter of power quality measurements.
- Gaps and technological development in Power Quality.
- Potential step and sustainable solution for Power Quality Measurement.
- Challenges and advancement in Power Quality measurement solutions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	To Be Announced

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.6.40 Emerging Technologies in Reducing AT&C Losses

Objective

To assist participants to modify their approach and to treat their feeders as profit centers.

Program Profile

- IE rules.
- Source of technical Losses and methods of reducing them.
- Application of new Technologies (HVDS&ABC) in distribution System.
- Source of commercial Losses.
- Setting and checking of actuators and methods of reducing them.
- Legal empowerment to control the menace of power theft.
- AT&C Losses.
- Role of consumer association and franchises to control commercial losses.

Venue	Duration	Date
Durgapur	03 Days	27-05-2020

Who may attend : Engineers from SEBs/ Power Utilities/ corporations with 2-3 years of experience.

4.6.41 Distribution Network Planning for UG Cable Systems

Objective

To familiarize Distribution Engineers in UG Cable system, Networking of Cables, Commissioning of Cables in the UG Cabling.

Outline

- Types of Networks & Preparations for UG cabling.
- Introduction to project Management, Planning & Management of Distribution Systems Current rating of cables.
- AB Cables Design & condition Monitoring UG Cable System.
- Conversion of OH Cables to ABC & UG.
- Planning & procurement of cables.
- Type of installation & corrective measure.
- Selection of route.
- Reconnaissance survey, Preliminary survey, Engineering, design considerations for OH_UG Lines/Towers & Associated substations.
- Cable laying – Methods for LV,MV and HV cables.
- Preparations of DPR, Project Monitoring & Control, Project execution-Issues and Challenges with Case studies.
- Field Visits to UG Substation.

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
Alapuzzaha	03 Days	16-09-2020
PSTI Bengaluru	03 Days	06-01-2021

Who may attend : Engineers with minimum 2-3 years experience in O&M Distribution Networks.

4.6.42 Power Cables and Jointing Techniques

Objective

To familiarize power engineers on the mechanical considerations in the design of cables, application current carrying capacity, insulation strength electrical properties of cables.

Outline

- Design & construction of Power Cables.
- Testing of cables.
- Testing of cable accessories.
- Demo of Cable Jointing.
- Failure of cables and case studies.
- Condition monitoring of power cables.
- Field Visits.

Venue	Duration	Date
Alapuzzaha	03 Days	28-09-2020
PSTI Bengaluru	03 Days	27-05-2020

Who may attend : Engineers from State Electricity Boards Power Utilities/ Corporations, R & D organizations, Academic institutions, Power consumers, consultants/contractors etc.

4.6.43 Distribution Metering

Objective

To Provide comprehensive view of Distribution metering, rules & regulations and rationalization required.

Outline

- Energy meters: Types & Construction.
- Testing, setting and calibration.
- Failure analysis.
- IE Rules.
- Theft/Tampering and Inspection of consumer premises.
- Distribution meter reading.
- Rationalization and computerization.
- Field visits

Venue	Duration	Date
Guwahati	01 Week	18-05-2020

Who may attend : Engineers from state Electricity Boards/ Power utilities/ Distribution System, R & D organizations, Academic institutions, manufacturers, contractors, consultants etc.

4.6.44 Transmission Line Maintenance and Introduction to Live Line Maintenance Techniques

Program Profile

- Substation maintenance philosophy and guidelines.
- Work permits, line clear procedure, maintenance of log books, records etc.
- Maintenance schedules : Routine, preventive, predictive, breakdown and emergency maintenance schedules.
- Transformer, switchgear and reactor maintenance.
- Transformer oil testing and dissolved gas analysis.
- Introduction Live line maintenance techniques.
- Type of tools used in live line maintenance.
- Live insulator testing methods & introduction to hotline washing (wet & dry).
- Case study.
- Audio visual shows on hot stick-methods and bare hand techniques.

Venue	Duration	Date
Badarpur	01 Week	22-02-2021

Who may attend : Executives in the rank of Jr. Engineers and above working in transmission line maintenance.

4.6.45 Hand - On Training on Power System for Engineering (PSSE)

Objective

Handson practice demonstration of PSSE Software.

Program Profile

- Basic of Power System.
- Hand flow Studies.
- Conting analysis and Voltage Stability.
- Short Circuit Studies, dynamics.

Venue	Duration	Date
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Who may attend : Engineers

Training Fee :

- 1.) Fee Residential per Participant twin sharing (inclusive of GST) = Rs. 30,444/-
- 2.) Fee Non-Residential per Participant twin sharing (inclusive of GST) = Rs. 24,750/-

4.7 HOT LINE TRAINING

4.7.1 Awareness Programme For Executives in Hot Line Activities

Objective

The course is meant for spreading awareness about the Live Line Maintenance Techniques (LLMT) amongst executives involved in EHV Line Maintenance in general and intended to highlight the scope of LLMT and its potential extension to EHV Switchyards in particular.

Program Profile

- Introduction to Hot Line Tools, Activities & Maintenance.
- Live participation in maintenance operation on 66KV, 220 KV Commercial lines.
- Live insulator Testing methods.
- Video and Film shows on Hot Stick Method and Bare Hand Technique.
- Introduction to Hot Line Washing (Wet & Dry).
- Extension of LLMT activities to switchyard.

Venue	Duration	Date
HLTC Bengaluru	01 Week	27-07-2020 19-10-2020 15-02-2021

Who may attend : Executives in the rank of Junior Engineer and above who are not trained in Hot line Activities.

4.7.2 Switchyard Maintenance Techniques using LLMT for Linemen/ Supervisors

The fast growing EHT/UHT Transmission lines and the rapid addition of 400 KV lines in the country, has made it imperative to upgrade the Live Line Maintenance Technology. The training program offers direct benefit to the organizations involved in maintenance of sub-stations by reducing the number and duration of shutdown. Learning these Techniques is essential in order to exploit the full potential of LLMT and it can increase the scope of Maintenance activities.

Objective

- Appreciation on maintenance of switchyard equipments.
- To highlight the importance of Live Line maintenance Technology in EHV switchyard.
- Give an introduction to Live Line washing techniques of EHV Substation Insulators.

Program Profile

- Electrical Safety & Safe Clearances.
- General practice of switchyard maintenance.
- Practice on climbing towers and switchyard structure, precaution at different working positions.
- Use of different hardware used in the maintenance works (Ropes, earthing equipment, load handling equipments, etc.).
- Hands on demo/training on live switchyard location using Hot Stick Method (HSM) and using Bare Hand Methods (BHM).
- Use of thermo vision Camera for detection of Hot Spots in Maintenance Works.
- Introduction to live line washing of insulators, video films on LLMT.

Venue	Duration	Date
HLTC, Bengaluru	04 Weeks	30-03-2020 08-03-2021

Who may attend : Foremen, Linemen, Asstt Linemen, Supervisors, Junior Engineers, asst. Engineers etc. actively involved in EHV Substation Maintenance activities having physical fitness. It is preferred that one of the nominee be from Executive cadre.

4.7.3 Familiarization Program on Cold Lines

Objective

The course is meant exclusively for the personnel working on cold lines from different power utilities; spreading awareness about general line maintenance techniques on uncharged lines amongst supervisors and technicians involved in Line Maintenance. The training program has been organized with the objective of giving appreciation about EHV Lines, highlight importance of maintenance and give a brief introduction to live line maintenance techniques.

Program Profile

- Electrical Safety, First Aid and Fire fighting.
- Safety precaution at different working positions.

- Tower climbing practices.
- Use of different hardware used in maintenance works (Ropes, earthing equipment, load handling equipment etc).
- General Practice of Maintenance work on Transmission Line.
- Introduction to Live Line Maintenance Techniques.

Venue	Duration	Date
HLTC, Bengaluru	04 Weeks	27-04-2020

Who may attend : Supervisors in the rank of Junior Engineer and ITI qualified Technicians who had undergone their basic/ Induction level course after recruitment.

4.7.4 Live Line Punctured Insulator Detection (PID) on EHV Lines

Objective

The course is meant for training on Testing of Insulator String of Suspension, Tension and 'V' String configuration on Live Condition of EHV Transmission Lines.

Program Profile

- Testing of Live Insulator string using software based Positron PID kit.
- Downloading of stored result from Memory of Kit to PC.
- Analysis of results (Graphical & Analytical Method).
- Preparing Test Report.

Venue	Duration	Date
HLTC, Bengaluru	01 Week	25-05-2020 17-08-2020 14-12-2020

Who may attend : Supervisors in the rank of Jr. Engineers and ITI qualified technicians who had undergone their basic/induction level course after recruitment.

4.7.5 Live Line Insulator Washing Techniques on EHV Switchyard/Lines at Onside

Objective

The course is meant for Training on Insulator Maintenance Techniques on cold/charged systems amongst Supervisors and Technicians involved in EHV Line/Switchyard Maintenance. The Training Program covers appreciation about Pollution on insulators of EHV systems, equipment etc. and to highlight the importance of care & maintenance on various types of insulators.

Program Profile

- Types and effect of Pollution on performance, its prevention and solutions.
- Safety aspects in Line/Hot Line Washing.
- Hot Line Washing Equipment set up and its operating procedures.
- Safety aspects in Hot Line Washing of line and substation insulators.
- Care and methods of Washing on sub station equipment line Circuit Breakers, Current Transformers and Potential Transformers etc.
- Practice of Hot Line Washing on Live Lines at Tension Point, Suspension Point Post Insulators etc.
- Introduction to Dry Washing and Hot Spray Systems.

Venue	Duration	Date
HLTC Bengaluru	04 Days	As per Customer requirement

Who may attend : It is preferred that only those who had worked in the relevant field and associated with some of the EHV line maintenance activities quite some time, say, 2 to 3 years, after completing their entry level (Induction level) training course on cold lines may only be sponsored so that many of the techniques need not have to be repeated. It is preferred that the participants of the course should have been exposed to some of the Live Line Maintenance jobs at least a couple of years before they are sponsored for this training this will enable the trainer to ease his efforts by simply recalling those techniques and concentrate more on the techniques relevant to actual line situation that are needed. Supervisors in the rank of Junior Engineers and ITI qualified Technicians may be considered for this course.

4.8 CONTROL AND INSTRUMENTATION ENGINEERING

4.8.1 Power Plant Instrumentation

Objective

To acquaint the Power Plant Professionals with theory and working principles of different types of instruments used in the power plant and their applications.

Program Profile

- General Description of Power Plant Instrumentation and control and their layout details.
- Working principles of Instruments.
- Temperature/Flow/Level and Pressure measurement.
- Control valves and actuators.
- Programmable Logic Controllers (PLC), their applications.
- Introduction to Distributed digital control system Hardware and Software configuration.

Venue	Duration	Date
Durgapur	03 Days	25-11-2020
Nagpur	04 Days	02-02-2021

Who may attend: Engineers from SEBs/Power Utilities/ corporations with 2-3 years of experience.

4.8.2 Control & Instrumentation (C&I) in Power Station (For Operation Engineers)

Objective

To acquaint the engineers working in Non- C&I areas with working principles of various instruments, the process parameters and with the relative process/plant behavior.

Program Profile

- General description of Power Station Instrumentation and control and their layout details.
- Basic Principles and working principles of instruments.
- Temperature Measurement.
- Flow Measurement.
- Introduction to On-Line Analytical Instrument.
- Introduction to Turbomachinery Instruments & Vibration Analysis.
- Discussion on Protection & Interlocks.
- Introduction to Automatic Control Loops.

Venue	Duration	Date
Badarpur	01 Week	21-09-2020
Nagpur	03 Days	17-06-2020
Neyveli	03 Days	17-02-2021
Shivpuri	03 Days	17-02-2021

Who may attend: Engineers with 2-3 years experience in the relevant field.

4.8.3 Data Acquisition & Distributed Digital Control System in Thermal Power Station

Objective

To familiarize the power station personnel on the new technology of plant control, monitoring and management which will soon replace the old conventional system and will apply in new units.

Program Profile

- Introduction to Data Acquisition system Hardware & Software configuration.
- Introduction to Distributed Digital Control.
- Hardware & Software Configuration.
- Advantages of Distributed Control System.
- Configuration of single loop and multi loop Controller.

Venue	Duration	Date
Nagpur	03 Days	27-01-2021

Who may attend: Engineers working in Power station with 3-7 years experience.

4.8.4 Data Sciences & Big Data Analytics

Objective

To familiarize professionals from utilities, IT Sector, Researchers and faculties from Academic and R&D Institutes about the

application of Data Sciences & Big Data Analytics in transforming the utilities to adopt this modern technology.

Program Profile

- Current Challenges for Utilities.
- Big Data for Utilities transformation.
- Descriptive, Prescriptive & Predictive analytics.
- Case Studies with industrial Orientation (Energy & Utility).

Venue	Duration	Date
Neyveli	03 Days	20-05-2020 09-12-2020

Who May attend: Engineers/Faculties/ Research Scholars/ PG students.

4.8.5 Power Plant Auto Control

Objective

To enable participants to line up, test, commission and maintain all control loops along with their hardware components.

Program Profile

- Auto Control Action Theory (PID) and their relevance to process reaction rate and dead time.
- Auto loops in Power Station with their built up action Hardware and Software.
- Selection and application of final control elements such as control valves, dampers, etc.
- Feed forward and feed back signal selections.
- Actuators: electric, Pneumatic and Hydraulic; their relative merits and applications.
- Thyristor drives and thyristor controlled drives.
- Limit switches and Torque switches
- Coordinated control concept and applications.
- Microprocessor based programmable logic controllers (PLC's) Distributed Digital Control System concepts.
- Periodical tuning Techniques and tuning requirements.
- Commissioning of Automatic control loops with individual action, tuning techniques on Automatic Control Simulators.

Venue	Duration	Date
Neyveli	03 Days	14-10-2020

Who may attend: Engineers with 2-3 years experience in the relevant field.

4.8.6 Power System Communication SCADA & EMS

Objectives

To familiarise power engineers with the architecture, functions and advantages of SCADA & EMS.

Outline

- Data Acquisition System.
- Supervisory Control.
- Communication: VSAT, Microwave, Optical Fibre.
- Communication networks & protocols.
- SCADA in Transmission and Distribution.
- EMS Hardware: Control Centre.
- EMS Software: SCADA & Database.
- EMS Software: Generation applications.
- EMS Software: Networking applications.
- Field Visits

Venue	Duration	Date
PSTI Bengaluru	03 Days	15-04-2020

Who may attend: Engineers from State Electricity Boards, Power Utilities/ Corporations, R & D organizations and Academic institutions.

4.8.7 Intelligent Load Management System

Objective

To acquaint and upgrade the participants with ILMS.

Program Profile

- Intelligent Load Management System, SCADA.
- Use of SCADA in GRID Operation.
- Visit To SCADA Control Room.

Venue	Duration	Date
Durgapur	02 Days	17-12-2020

Who may attend : Experienced Diploma and Graduate Engineers DISCOMS & GENCOS.

4.8.8 Vibration Diagnostics and Fault Analysis

Objective

To impart expertise and to give latest information regarding different methods of vibration measurement, fault diagnosis, analysis & remedial actions.

Program Profile

- Principles of Vibration.
- Basic motion, period, frequency, natural frequency, reasons, critical speeds.
- Data Acquisition Instrumentation, Transducer operation – selection, Signal processing, FFT application.
- Fault Analysis Spectrum analysis, mass unbalance, misalignment, mechanical looseness, bearing defects, central fault recognition.
- Instrumentation Transducer operation, Transducer selection.
 - Sensor mounting issues, Mounted Natural Frequency.
- Signal processing, FFT application.
 - Linear versus logarithmic, Trending.
 - Workshop.

Venue	Duration	Date
Durgapur	03 Days	09-11-2020

Who may attend : Engineer and supervisors with at least 2 years experiences in O & M of Power Station and other industries.

4.8.9 PLC & SCADA in Thermal Power Plant

Objective

To familiarize power engineers with the architecture, functions and advantages of PLC & SCADA in Thermal Power Plant.

Program Profile

- Introduction to PLC.
- Application of PLC in Thermal Power Plant.
- Data Acquisition System.
- Supervisory System – Communication System-Wire Wireless.
- Communication Networks & Protocol SCADA in Thermal Plant.

Venue	Duration	Date
Neyveli	02 Days	09-09-2020
Shivpuri	02 Days	17-09-2020

Whom to attend : Engineers.

4.8.10 Burner Management System/FSSS

Objective

To build up skills and knowledge required to maintain the Burner Management System of modern boilers with solid state relay logic control components.

Program Profile

- Flame sensors; their types, selection, application and installation techniques.
- Flame scanning intelligence.
- logics and logic circuit built around solid stat relay devices for working out permissive.
- Fuel sequencing, fuel cut off and boiler trip protections.
- Logics and logic circuits for sequential start up and shut off procedures.

Venue	Duration	Date
Neyveli	03 Days	09-12-2020
Shivpuri	03 Days	09-12-2020

Who may attend : Fresh Engineers engaged in Control and Instrumentation.



Participants of Renewable Energy Integration Program at NPTI Alappuzha



Participants of 3-Days program on 'Managerial Practices in Corporate-Finance for Power - Projects' from 4th - 6th December, 2019 at NPTI Faridabad

4.9 DISASTER AND SAFETY MANAGEMENT

4.9.1 Fire Prevention, Protection & Safety

Objective

To make the trainees aware of the causes of fire hazards in Power Station industry and the prevention/protection system necessary to be installed.

Program Profile

- Different types of fire hazards in Power Plant and Industry.
- Plant design & layout with respect to fire hazards and prevention.
- Classification of fire and various methods to combat fire.
- Fire fighting arrangement in different areas of Power Plant and Industry.
- Safety connected with fire hazards in Electrical Installations.
- Application of different safety rules in Industry.
- Management of fire fighting & First Aids.

Venue	Duration	Date
Nagpur	03 Days	09-12-2020

Who may attend : Engineers and Senior Supervisor of Thermal Power Station and process industries.

4.9.2 Disaster Management, Electrical Safety Procedures and Accident Prevention

Objective

The objective of this course is to build the capacity of Top and Middle Level Executives management to adopt electrically safe procedures to prevent accidents and promptly respond and take measures to tackle any disaster situation. The course will focus on the following learning objectives:

- An in-depth understanding of electrical safety procedures, and accident prevention techniques.
- Learning how to manage the situation after an accident has occurred.
- Participating learning to fight the fire.
- Learning the first aid techniques to assist and help the victims of an accident.
- Preparedness required for various types of disasters (Flood, Storms, etc.).
- Learning to cope with the situation created by the various disasters.
- Learning about the role and responsibilities of utility officials in the accident prevention.

Program Profile

- Disaster and Impacts Warning Systems and Response Management and Mitigation.
 - Impact of different types of disasters, Trigger mechanisms and wiring systems.
 - Check lists and preparedness to address disasters.
 - Development of an On-Site and Off-site Disaster management Plan.
 - Development of Mock Drill Format's Institutional set up for disaster.
- Electrical safety procedures and Manuals.
 - Indian Electricity Rules, The Safety systems & Procedures, Accident prevention methods, Safety codes.
- Accident prevention techniques and Accident Reporting procedures.
 - Recording and Reporting systems, Review and methods to avoid recurrence.
 - Accident analysis, Technical prone to accident analysis.
 - Ergonomics, Reports filling details.
 - Investigation reports, Steps to avoid recurrence.
- Standard earthing practices.
 - Standard earthing practice, Materials towards earthing, Earthing at substation, lines, service centers, etc.
- Power Grid Collapses.
 - Role of distribution utility, Causes and remedies, Black start procedures, Restoration procedures, Islanding systems, equipment, and procedures.
- Firefighting Techniques-Electrical and Oil fires.
- Firefighting norms for sub stations, Firefighting equipment's and systems, Care and operations for combating fire.

- First aid practices for different emergencies.
- First aid victims under different cases – fractures, burns, electrical shock, unconsciousness, snake bite, fall from height, cuts and wounds, Artificial respiration systems, Treatment for electrical shocks, Mechanical accidents.
- Case Studies based on the above topics.
- Incorporation exercise based on the above topics.

Venue	Duration	Date
Durgapur	05 Days	

Who may attend : Managing Director, CEOs, Superintending Engineer, Chief Engineer, Executive Engineer, Assistant Engineer and their Equivalent.

4.9.3 Electrical Safety and Inspection of Electrical Installations, Accident, Prevention Recent Trends

Objective

To familiarize about the mandatory procedures before energizing any electrical equipment from LV to EHV level by consumers/suppliers and the role of electrical inspectors in enforcing IE Rules 1956.

Outline

- Overview & Safety Requirements of IE Rules.
- Design of Electrical installations.
- Earthing System Design.
- Circuit Breakers and Protective Relays.
- Basic Protection Schemes of Power Equipments.
- Inspection procedures for statutory inspection by Electrical inspectors.
- Check Point of Electrical inspection
- Pre-commissioning tests of Transformers, Switchgears and Power Cables.
- First Aid and Fire Fighting Practices in Industrial Installations/Substations.
- Field Visit.

Venue	Duration	Date
Alapuzza	03 Days	07-10-2020
PSTI Bengaluru	03 Days	13-05-2020
	03 Days	12-10-2020
Guwahati	01 Week	17-08-2020
	03 Days	07-12-2020

Who may attend : Industrial/other consumers of electricity, electrical inspectors/ assisting officers, utility representatives, manufacturers/dealers of electrical equipment/power cables/LT/HT switchgear.

4.9.4 Safety in Hydro Power Station

Objectives

To acquaint the participants with the safety aspects of Hydro Power Station.

Program Profile

Safety: General safety precaution, treatment of electrical or acid/alkali burns, permit to work, first aid, protective gear/clothing, safety in movement and storage of materials, safety aspects of switchyard. Fire safety procedure. Fire protection of generator. Firefighting and emulsifier type protection.

Venue	Duration	Date
Nangal	03 Days	07-04-2020

Who may attend : Engineers/Shift Engineers/Operators working in Hydro Power Plant.

4.9.5 Operational Safety

Objective

To acquaint the participants with safety aspects in work place.

Program Profile

- Permit to work Practice/procedure.
- Fire Fighting basics and process.
- Fire extinguisher types and selection.
- Fire Fighting Demonstration.

- Precautions and process while handling equipments and Safety Equipments.

Venue Durgapur **Duration** 02 Days **Date** 07-09-2020

Who may attend : Operators, ITI Holders, Diploma & Engineers (Fresher & Experienced).

4.9.6 Electrical & Fire safety for Distribution Utilities

Program Profile

- Clearances & compliances of CEA (Measures relating to safety & electrical Supply) Regulations.
- Safety & system Earthing.
- Methods of earthing.
- Safety aspects in Service connection & Installation.
- Tools & Plants for Maintenance.
- Operation & Maintenance procedures for Distribution System.
- Breakdown Operations in distribution systems.
- HT- LT Metering & Testing.
- Safety aspects in Street Lighting.
- Fire fighting techniques for Electrical and oil fires in sub stations and First Aid practices for different emergencies.

Venue PSTI **Duration** 03 Days **Date** 24-06-2020

Who May attend :

4.9.7 “Measures Relating to Safety and Electrical Supply”

Objective

- Clearances and Compliances of CEA (Measures relating to safety and electrical supply Regulation 2010 : Minimum

clearance between phase to phase and phase to ground for different Voltages, CEA (Measures relating to safety and electrical supply Regulation 2010 pertaining to Sub-stations.

- HV Sub-station: main equipments used including Gas Insulated Switching system and their safety norms.
- Detailing of High Voltage Lines, Types of Towers, types of insulators and their electrical and mechanical characteristics and safety aspects.
- Introduction to Indian Standard Specification for Electrical wiring, Energy Conservation Switch Yard Operation and Maintenance- Circuit Breakers and Isolators and Bus bars: their types, operating mechanism, maintenance procedures and case studies. Current Transformers, Potential Transformers and Lightning Arrestors.
- Control Room: Necessity and function of boards, types of boards, types of relays and indicators, mimic diagram. Function of various relays, their settings. Remote control of breakers, isolators, tap changers. All in respect of safety.
- Earthing: Safely earthing and system earthing, methods of earthing. Peterson coil earthing, earthing of Lightning arrestors- importance and advantage. Earth electrodes, earth mats, values and measurement of earth resistance.
- Capacitors and their functions, Types, ratings and case studies of failure. Safety requirements.
- Transformers-Function and Maintenance aspects. Safety opted in O&M.

Venue	Duration	Date
Alapuzzaha	01 Week	24-07-2020 26-08-2020 15-12-2020 24-02-2021
Faridabad	01 Week	Mutually Agreed
Who may attend : All Level		



Renewable Energy Grid Integration at PSTI Bengaluru 26-31, August 2019



Renewable Energy Integration Program at NPTI Alappuzha in association with GIZ

4.10 GRID INTEGRATION, SMART GRID & SMART CITIES, EV AND ENERGY STORAGE SYSTEM

4.10.1 Renewable Energy Generation & Integration with Grids

Objective

To investigate the impact of Renewable Source & their integration with the grid.

Program Profile

- Overview of Power Scenario and Importance of Renewable Energy.
- Solar Energy.
- Wind Energy.
- Bio-Mass Energy.
- Renewable Energy Purchase Obligations.
- Tariff Regulations related to Renewable Energy.
- Renewable Energy Power Evacuation Issues.
- Net Metering and grid Connectivity for Renewables.
- Role of Smart Grid in Integration of Renewable Energy and DSM.
- Renewable Energy Certificates.
- Grid Operation and balancing of Renewable Energy Power.
- InterConnection Standards of Distributed Generation.
- Field Visits.

Venue	Duration	Date
Alapuzzaha	03 Days	14-10-2020

Who may attend : Engineers from State Electricity Boards/ Power Utilities/ Distribution Systems, R&D organizations, involved in implementation of renewable source and their integration.

4.10.2 Design, Operation, Economic Evaluation of Floating Solar and Wind Integration in Existing Hydro Plants and Sub-Station/ Planning of Sub-Station Up-Grading

Outline

- Feasibility study of floating solar system and wind farms in hydro generation.
- Design, O&M of floating solar and wind energy systems.
- Economic evaluation of floating solar systems and wind energy systems.
- RE Grid penetration issues, challenges and technology solutions.
- Solar and wind energy integration in existing substation.
- Up-grading of existing substation/ infrastructure for floating solar and wind energy systems.

Venue	Duration	Date
NPTI Faridabad	03 Days	

Who may attend : Hydro Power Engineers.

4.10.3 SPV Power Plant - Integration with Grid and Storage Batteries

Objective

To Understand the significance of Renewable Energy particularly solar Generation and Technology

Outline

- Overview of renewable energy in India-Feasibility studies.
- Introduction to PV Technology Basic of Solar cell & PV modules-Engineering process Technology.
- Solar charge controller –types Basic of Solar Inverter.
- Introduction to SPV Design; types of SPV system & their components.
- Basic understanding of SPV System Integration.
- On Grid/Hybrid/Grid-interactive SPV System.
- SPV Project implementation, basic criteria requirements, standards & Procedures.
- Manufacturing Technology of Solar PV Modules.
- Field Visits.

Methodology

Lectures, fields visits, lab sessions

Venue	Duration	Date
PSTI Bengaluru	03 Days	02-12-2020

Who may attend : Professionals from Power Sector, Engineers, Academicians, Researchers, Entrepreneurs.

4.10.4 Smart Grids and Renewable Energy Integration

Objective

The Objective of the workshop is to enhance the knowledge of the participants in the area of the "Smart Grid and Renewable Energy Integration", developing practical strategies that energy generators, project developers and grid operators can implement to overcome obstacles posed by local planning schemes and regulations, in an intelligent, cost-efficient and timely way.

Program Profile

- Importance of emerging role of Smart Grids for future Power Systems.
- Differences between Traditional Grids and Smart Grids.
- Grid Integration and Renewable energy storage, integration and prediction.
- Grid integration challenges and prospective solutions.
- The role of Smart Grid in Integrating Renewable Energy.
- Comprehensive overview of Smart Grid Pilot Projects

Venue	Duration	Date
Alapuzzaha	02 Days	17-12-2020
Faridabad	01 Day	Mutually Agreed

Who may attend: Engineers/ Managers/Researchers from power industry including R&D Labs, Student or Faculty interested in the area of RE integration in Smart grids.

4.10.5 Role of Smart Grids on the Indian Power Sector: Current Developments, Challenges and way Forward

Objective

To acquaint the participants with the current development in the field of smart grid and the challenges in the field.

Program Profile

- India's energy realities and emerging needs.
- Smart Grids - Concept and application areas.
- Global Developments.
- Developments in India.
- One model of Mini Grid.
- Integration of Mini Grid to Smart Grid.
- How to make Mini Grid to Smart Grid.
- Challenges to Accelerated Deployment.
- Case Study.
- Way Forward.

Venue	Duration	Date
Alapuzzaha	02 Days	18-02-2021
Badarpur	02 days	01-02-2021

Who may attend : Engineers working in Transmission & Distribution sector.

4.10.6 Development of Microgrid (MG) and Macrogrid (MCG) in India

Objective

Small architecture of electrical network developing in India and taking the shape of Macrogrid and Microgrid. Development of Microgrid requires lots of attention for equipment selection, integration, system studies and smart control & monitoring system.

Program Profile

- Concept note and detailing of Microgrid and Macrogrid in India.
- Architecture and modeling of Microgrid and Macrogrid.
- Uncertainty and modeling challenges in MG, MCG.
- Optimal solution and recent development of MG, MCG.
- Challenges in implementation of MG and MCG.
- MG, MCG development for Rural India and Potential.

Venue	Duration	Date
HLTC Bengaluru	03 Days	Mutually Agreed
Nagpur	03 Days	Mutually Agreed

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment manufacturers, Researchers, Engineering, Managers.

4.10.7 Smart Grid and Smart Metering Technologies and Applications

Objective

To familiarize the power utility engineers with the optional operation of the utility systems through the application smart grid and smart metering technologies with their applications.

Outline

- Smart Grid Goals, History, Scale and Scope.
- Functions and Features of Smart Grid, Demand Response Support.
- Net metering and Grid Connectivity of Renewable Sources.
- National and International Specification on Smart Meters and energy meters.
- Smart Meters - Issue and Concerns.
- Standardization of Smart Metering.
- Inter Operability Testing Methods and Specials Purpose Energy Metering.
- Technology challenges and way forward.
- Demonstration at PSTI.
- Role of Smart Meters in Arresting Theft/Tampering.
- Field Visits.

Venue	Duration	Date
PSTI Bengaluru	03 Days	08-06-2020

Who may attend : Engineers from State Electricity Boards/ Power utilities/Distribution Systems, R & D organisations, Academic institutions, manufacturers, contractors, consultants etc.

4.10.8 Smart Grid for Utility Engineers

Objective

To familiarize the Power Utility Engineers with the optimal operation of the Utility Systems through the application of Smart Grid.

Program Profile

- Smart Grid Basics/ Overview and Evaluation of Micro Grid.
- Developing a Smart Grid Roadmap in India.
- On-going Smart Grid Activities in India.
- Smart Grid for Distribution Network and Initiates.
- RE based Distributed Generation and Smart Grid of the future.
- Grid Integration of Solar in to Power System.

Venue	Duration	Date
Durgapur	02 Days	21-09-2020
Shivpuri	03 Days	21-09-2020

Who may attend : Engineers involved in the operation and control of Distribution system and Academician with 2-3 years experience in the relevant field.

4.10.9 Assessment of existing transmission corridor/ infrastructure feasibility for evacuating additional 100 % power over & above the existing hydropower with upcoming RE

Outline

- Grid Code and Technical Standards with reference to RE Generation, Transmission and Distribution.
- Transmission System Planning - Up gradation in open access, feasibility studies infrastructure.
- Deviation Settlement Mechanism and Congestion Settlement Mechanism in Dynamic Power Market.
- Tariff Determination Methodology, CERC Tariff Guidelines and determination of tariff for hybrid energy systems.
- Concept of ATC, TTC and Ancillary Services in Large Renewable Energy ERA.
- Hands on practice using MS-Excel for tariff determination.

Venue	Duration	Date
NPTI Faridabad	03 Days	Mutually Agreed

Who may attend : Hydro Power Engineers.

4.10.10 Development of Intelligent Power Monitoring System for Reliable Operational Strategy in Upcoming Evolving Dynamical Market

Outline

- Traditional Power Flow Controllers, Concept of SCADA and DCS and IoT based control strategy.
- Traditional Grid Constraints, Evolving Micro grid Model and Smart Grid Technologies in upcoming large RE.
- Smart Grid components, planning of Smart Power Flow Controllers and PMUs in Intelligent Environment for reliable System operation.
- Advanced Metering Interface (AMI), Substation Communications Protocols in decentralized framework.
- GIS and Asset Management: Analytical approach.
- Methodology of Smart Generation, Smart Transmission and Smart Distribution.

Venue	Duration	Date
NPTI Faridabad	03 Days	Mutually Agreed

Who may attend : Hydro Power Engineers.

4.10.11 Smart Power Flow Controller for Smarter Grid Applications

Objective

Smart Grid is an initiative to modernize the existing electric power system, which is envisioned to be integrating necessary devices for its most reliable and efficient operation. One such operation is an independent control of the active and reactive power flows in existing transmission lines with the use of a goal-oriented SMART Power Flow Controller (SPFC) that enhances the controllability in an electric power transmission system by using functional requirements and cost-effective solutions. The direct benefit of independent control is to maximize the useful active power flow while minimizing the less desirable reactive power flow, thereby reducing losses due to the reactive power flow in a transmission line, which increases the system efficiency. A SPFC fulfills the true needs of a utility for its everyday use and they are high reliability, high efficiency, low installation and operating costs, component non-obsolescence, fast enough response for utility applications, high power density, interoperability, and easy relocation to adapt to changing power system's needs while providing the optimal power flow control capability. The participants will hear from an expert who actually designed and commissioned a few power electronics-based power flow controllers since its inception in the 1970s.

Program Profile

- Principles of active and reactive power compensation.
- Traditional power flow controllers – voltage regulating transformer, phase angle regulator, shunt inductor/capacitor, and series inductor/capacitor.
- Voltage-sourced converter (VSC) – 2 and 3 level poles.
- 6, 12, 24 and 48-pulse harmonic neutralized VSCs.
- PWM VSC, VSC-based technology and its implementation, comparison of simulation and field results; Sen Transformer.

Venue	Duration	Date
Faridabad	01 Day	Mutually Agreed
PSTI Benagluru	01 Day	Mutually Agreed

Who may attend : Junior and Middle Level Managers/ Executives from DISCOMs/TRANSCOs/ Regulators/Consultants/ Faculty/ Researchers/P.G Students.

4.10.12 Determination of Strategic Power Controllers : Design and Analysis with Optimal Locations in Hybrid Mix Energy Era

Outline

- System Planning with Strategic Power Controllers, Application of FACTS Controllers in Hybrid Energy Systems.
- Governing Factors of Hybrid Energy System's Reliability and Advance Technology Solutions.
- Existing Control Methodology in Hybrid Energy Systems: Analytical Assessment.
- Intelligent Control Concepts for Hybrid Energy Systems.
- Smart Power Flow Controllers for Hybrid Energy Systems: Layered Architecture.

- Smart Controllers in Hybrid Energy Systems: Performance Evaluation.

Venue NPTI Faridabad **Duration** 03 Days **Date** Mutually Agreed

Who may attend : Hydro Power Engineers.

4.10.13 Smart Grids for Smart Cities

Objective

To provide comprehensive view of Smart Grids.

Outline

- Concept and Salient features of smart grid as per GOI initiatives.
- Infrastructure upgrade of sub transmission and distribution networks.
- Smart city's energy requirements coming from solar, renewable energy utilization.
- And de-centralized distribution generation for smart cities.
- Smart efficient street lighting.
- Outage management system.

Venue PSTI Bengaluru **Duration** 03 Days **Date** 28-04-2020

Who may attend : Engineers from State Electricity Boards/ Power utilities/ Distribution System, R&D organizations, Academic institutions, manufactures, contractors, consultants etc.

4.10.14 Grid Integration of Hybrid Generation: Review of existing Substation controls required for upcoming RE mix in Switchyard and handling intermittency with Grid and Energy Storage Options

Outline

- Hybrid Generation fundamentals and challenges, concepts of Grid Interface Technologies.
- Review of existing substation for interconnection with upcoming RE Generation: Analytical Approach.
- Energy Balancing Mechanism and scheduling of RE System with adequate controls for RE interconnection in existing switchyard.
- Hybrid Generation Era Grid Codes: Technical Standards and handling of intermittency in integrated large grid.
- Evolving Energy Storage Technologies (Pumped Storage, Battery Storage Technologies, Thermal Storage and Flywheels).
- Renewable Energy Regulation in Energy Market: Technology options for effective energy storage.

Venue NPTI Faridabad **Duration** 03 Days **Date** Mutually Agreed

Who may attend : Hydro Power Engineers.

4.10.15 Battery Maintenance

Objective

To make the participants understand different types of storage batteries, their applications, maintenance procedures and requirements. They will also acquire the knowledge of battery testing and test equipment etc.

Program Profile

- Introduction and constructional details of batteries.
- D.C. supply system.
- Charging and discharging of batteries.
- Preparation of electrolytes.
- Battery plate assembly and dismantling practices.
- Care & maintenance of batteries.

Venue Neyveli **Duration** 03 Days **Date** 07-10-2020

Venue Shivpuri **Duration** 03 Days **Date** 25-11-2020

Who may attend : Technicians working in Power Stations with 2-3 years experience.

4.10.16 E-Mobility Mission of India: Concepts & Implications

Objective

The objective of this seminar is to discuss, in a convenient environment, the opportunities and prospects of the sector, improve cooperation and business environments for sustainable transport sector, define jointly and share the vision of electric mobility. India has announced a major transformation to electric vehicles by 2030. The Government has also initiated Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME) scheme which provides incentives for purchasing electric vehicles. Substantially, the 'National Electric Mobility Mission Plan (NEMMP) 2020' which was formed in 2013 addresses issues of National energy security, vehicular pollution and growth of domestic manufacturing capabilities.

The Seminar will address the competitive landscape of electric vehicles worldwide, coupled with the vast opportunities and potential challenges of EV development in India. This Program will gather policymakers all over from India, representatives from the Indian EV industry, relevant research communities and provide them the platform for networking. You will also get updates on how Indian EV industry, research communities, policymakers and citizens together can create a sustainable mobility sector.

Program Profile

- Hybrid and Electric Vehicles for India (E-Mobility - Road, Rail, Metro & Drones).
- International Standards for EVs and their impact on EV deployment, R&D and manufacturing in India. (Future Trends and Market in EV deployment).
- EV System architecture concepts.
- EV Motor drives and controllers.
- Storage Systems & New Battery Technologies, Potential and Forecasts.
- EV Charging Systems. (Smart Grid, Charging Infrastructure and V2G).
- Power grid and renewable energy resources interfacing for EV Development. (ICT services for EV ecosystem).

Venue Faridabad **Duration** 02 Days **Date** Mutually Agreed

Venue Neyveli **Duration** 02 Days **Date** 18-11-2020

Who may attend : Indian and global EV manufacturing industry in the automotive hub of India automotive industry leaders, Govt. leaders, policy makers, business people, innovators, technicians, consultants, and research and development professionals, all looking for greater efficiency, safety, and low carbon vehicle.

4.10.17 Battery Energy Storage & Microgrids in India

Objective

To deliberate on issues regarding battery energy storage its testing, quality analysis & battery management systems and microgrids as mentioned below:

Program Profile

- Energy Storage System Status in Global & Indian Market.
- Current Energy Storage Systems.
- Types and features of energy storage systems. (Classification of EES systems, Mechanical storage systems, electrochemical storage systems, Chemical energy storage, Electrical storage systems & Thermal storage systems).
- Standards & Technical Comparisons.
 - Standards for EES.
 - Technical comparison of EES technologies and On-grid solutions & off-grid solutions.
- Peak Load Management & DSM.
 - Benefits of storage and managing peak load.
- Markets for EES.
 - Present status of applications.
 - Utility use. (conventional power generation, grid operation & service).
 - New trends in applications. (Smart Grid, Smart Microgrid, Smart House, Electric vehicles).
- Lead acid batteries.

- Basics operating technology and battery performance requirement for different applications.
- Different designs of lead acid to meet the performance requirements.
- Materials & methods of manufacture of lead acid batteries.
- Effect of material used Vs different performance requirements.
- T Q A of Lead acid batteries.
 - Understand various manufacturing processes, advantages and shortcomings of these processes.
 - Basic process of quality assurance.
 - Key quality control & test points for acceptance or rejection.
 - Symptoms for trouble and corrective measures.
- Lithium ion batteries.
 - Basic chemistry and their comparison related to performance, applications & cost.
 - Manufacturing advances, Battery components, Equipment & Recycling.

- Energy Storage system Design considerations for grid applications.
- T Q A of Lithium ion batteries.
 - Safety, Standards, Testing and Certification related to ESS.
 - Key quality control & test points for acceptance and rejection.
 - Case studies of Energy storage projects in global scenario.

This two-day workshop will provide participants with knowledge of Microgrids, its architecture, Battery energy storage systems of both lead acid type and Lithium ion type its testing & quality analysis.

Venue	Duration	Date
Alapuzzaha	02 Days	12-11-2020
NPTI Faridabad	02 Days	Mutually Agreed

Who may attend : Officers of the power sector organizations, GENCO's, DISCOMs, Regulatory commissions, TRANSCOs and all power sector stakeholders.



Two weeks Induction Training Program for JEE (Distribution) for Bihar State Power (Holding) Co. Ltd.
From 29 July 2019 to 09 August 2019



Director General and PGCIL Officials visit at NPTI Shivpuri

4.11 IT, ICT, GIS & RS, BIG DATA ANALYTICS AND CYBER SECURITY

4.11.1 IT General for Utility Engineers

Objective

The objective of this course is to build the capacity of the Utility Personnel to improve their performance by the enhancement and communication of knowledge concerning the development of IT-based services, the management of IT resources, and the use, impact, and economics of IT with managerial, organizational, and society implications.

Program Profile

- Introduction to Computer, Internet, networking, Email, Hardware Etc.
- Elements of Word, Excel, PowerPoint or similar packages.
- Customer Care Services.
- Management Information System.
- E-Governance including advantages/Applicability of IT to present distribution system including Success Stories / Case Studies, Security / Access Rights.
- Data Center Operation and Maintenance.

Venue	Duration	Date
NPTI Faridabad	01 Day	Mutually Agreed

Who may attend : Chairman/MD, Director, Chief Engineer, Chief Accounts Officer, Superintendent Engineer, Executive Engineer, Assistant Engineer, Deputy/Accounts Officer (or) any other equivalent rank mentioned above.

4.11.2 Cyber Security in Power Sector

Objective

The aim of this workshop is providing critical inputs to generation companies, transmission companies, distribution companies and system operators to protect their infrastructure from cyber-attacks, evaluate the risks and proactively initiate actions for safeguarding from damages.

Program Profile

- Evolution of cyber threats.
- Cyber security key challenges covering: Appreciation of threat itself, Challenges in the discovery of the threat, identifying the perpetrator or the source of the threat, determining the appropriate response, Lack of international legal framework.
- Cyber security objectives: Confidentiality, Integrity, Availability.
- Cyber security requirements : Identification, Authentication, Authorization, Trust, Access Control, Privacy.
- Components of cybersecurity strategy: Prevention, Detection, Response, Recovery.
- Five step methodology: Selection of use cases with cyber security considerations, Risk assessment methodology, Development of security architecture, High level security requirements, Assessment of smart grid standards.
- Privacy and smart grid.
- Research and development themes: Device level, Cryptography and key management, Systems level, networking issues.

Venue	Duration	Date
Faridabad	01 Day	23-08-2020
Shivpuri	03 Day	24-08-2020

Who may attend : Power Sector Professionals involved in Information security of the Power Sector, researchers, professionals from academic and R&D Institutions.

4.11.3 Geo-Spatial Approach in Power Sector

Objective

The objective of the workshop is to enhance the knowledge of the participants in the area of Integration of Geospatial Technologies in Power Sector, with practical strategies that energy generators, project developers and grid operators can implement to overcome obstacles posed by local planning schemes and regulations and importantly, how this can be done in an intelligent, cost-efficient and timely way.

Program Profile

- GIS based Electrical network mapping.

- GIS based Consumer database indexing, Metering, Billing & Collection Efficiency.
- System & Distribution Automation.
- Load forecasting and load planning.
- Remote Sensing application in Power Sector.

Venue	Duration	Date
Faridabad	03 Days	Mutually Agreed

Who may attend : Engineers and Researchers from Power industry including R&D Labs, Student or Faculty interested in the area of Geospatial Integration in Generation, Transmission & Distribution.

4.11.4 Adoption of Big Data and Analytics - Towards Utilities Transformation

Objective

A large amount of structured and unstructured data is being generated every day from smart meters and the automated metering infrastructure, load dispatch centres, maintenance practices in power plants, transmission and distribution infrastructure. This real-time data if handled properly could give us actionable insights and lead us to transformation of utilities by optimising the expenses and giving reliable and quality power at affordable cost. There are a plethora of benefits offered by Big data analytics but at the same time there are a number of apprehensions in the mind of the organizations who want to start the Big data journey.

This workshop would be centered on the capabilities of the Micro modular servers that are an ideal solution for creating cluster with hundreds or thousands of data/compute nodes. The workshop will focus on demonstrating how a combination of micro modular server and Hadoop (Big Data Platform) can offer a solution for utilities right from generation to consumption and how Big data analytics can help in transforming the utilities to Utility 2.0 and beyond.

Focused Areas

- Current Challenges for Utilities.
- BIG Data for Utilities transformation.
- Demo on the platform – show case of business issue demonstration.
- Leverage power of open source for utilities.
- Role of NPTI Centre of Excellence.

Venue	Duration	Date
Faridabad	03 Days	Mutually Agreed

Who may attend : Senior Management Utilities Professionals/ DISCOMs - MD, Director-IT, RAPDRP Head, Load Dispatch Centre (SLDC/RLDC/NLDC), Finance, Data Centre / Disaster Recovery program Head from Utilities. Power sector Professionals managing the IT setup of Utilities, Process Owners, Researchers and Professionals from academic and R&D institutions.

4.11.5 Smart Grid Technologies, Internet of Things and Cyber Security

Objective

To familiarize power system engineers with Smart Grid technologies, Internet of Things and Cyber Security.

Program Profile

- Conventional Electrical Grid, its Operation and Control.
- Smart Grid System, its architecture and Advantage.
- IoT aided Renewable Energy System – Solar & Wind – Smart
- Electric Vehicle – Smart Cities etc.
- Cyber Security Issues in IoT Based Smart Grid Systems & Solutions – Challenges.

Venue	Duration	Date
Neyveli	02 Days	25-02-2021
Shivpuri	02 Days	25-02-2021

Whom to attend : Engineers.

4.11.6 Block Chain Technology.

Objective

To Familiarize Power engineers and IT professionals about the emerging technology suitable for decentralized sharing of data across a large network of entrusted participants.

Program Profile

- Introduction to Block Chain.

- Smart contracts and ledgers, Ethereum frame work.
- Crypto currency Concepts & Applications.
- Integration of block chain & Crypto Currency.
- Application of Block chain Technology to Power students.

Venue Alapuzzaha
Duration 02 Days
Date Mutually Agreed

Neyveli 02 Days 24-06-2020 25-11-2020
 Shivpuri 02 Days 19-11-2020
Who May attend : Engineers/Faculties/ Research Scholars/
 PG students.



National Conference on 'Power Scenario and Challenges of Indian Power Sector' organize by NPTI, Durgapur



National Workshop on 'Smart Metering Infrastructure for Distribution Utilities – An Asset Management Framework' organized by PSTI Bengaluru



Consumer awareness program on Electric Vehicle at NPTI Faridabad by Ministry of Heavy Industries

4.12 ENERGY EFFICIENCY, ENERGY AUDIT AND DEMAND SIDE MANAGEMENT

4.12.1 Energy Efficiency Management in Power System

Objective

To acquaint with the existing and emerging technologies in the area of energy efficiency and energy management.

Program Profile

- Salient features of power generation, transmission and distribution system equipments and their functioning and monitoring.
- Measurement of performance parameters and energy efficiency calculations.
- Energy efficient technologies.
- Demand side management.
- Investment decisions for enhancement of energy efficiency.

Venue	Duration	Date
Durgapur	03 Days	16-09-2020

Who may attend : Engineers working in the area generation, transmission and distribution.

4.12.2 Accelerating Energy Efficiency in India: Initiatives & Opportunities

Objective

The workshop would give an opportunity to the Participants to deliberate upon the initiatives & opportunities to accelerate energy efficiency in India. Energy efficiency is one of the most important aspect to reduce demand-supply gap. Focus on energy efficiency is required as it is easiest way to implement in shorter time. Immense investment opportunities have emerged in the field of energy efficiency in various sectors including Iron and Steel, Textile, Cement, Pulp & Paper, Thermal Power Plants, Aluminium, Chemical, Street Light, Transportation, Railways, Transmission & Distribution, Residential & Commercial Buildings, Agricultural and Municipal water pumps, Ceramic, Coal and Small & Medium Enterprises (SMEs) etc. To ensure national energy security and sustainable supply the country's energy sector needs rapid renovation. Awareness regarding efficient usage of energy in all sectors is the need of the time.

Program Profile

- Energy Efficiency: Potential and Benefits.
- Energy Efficiency initiatives: Targets, Strategies and Engagement.
- Energy Efficiency in Transport Sector: Potential, Saving measures & Investment.
- Energy Efficiency in Buildings Sector: Potential, Saving measures & Investment.
- Energy Efficiency in Industrial Sector: Potential, Saving measures & Investment.
- Lighting and Appliances - Instruments, Policies, Schemes/ Programmes, Innovations.
- Energy Efficiency Finance: Public and Private Sector Investment.
- Energy Efficiency Progress: Examples from Developed and Emerging Economies.

Venue	Duration	Date
Faridabad	02 Days	Mutually Agreed

Who may attend : The Workshop is Sector neutral and participation from across Industries, Transportation sector, Municipal corporations, Real estate developers, Researchers, Professionals from academic and R&D Institutions is solicited.

4.12.3 Efficient Energy Management

Objective

This program analysis of the power supply grid and connected consumers (loads) is necessary for effective use of the involved measurement techniques.

Program Profile

- Three-phase consumers with star and delta connections (R, L, C, RL, RC and RLC loads).

- Measurement with active and reactive energy meters: for symmetric and asymmetric RL loads in the event of a phase failure.
- In the event of over-compensation (RC load) for active loads in the event of energy-flow reversal.
- Determination of the first and second power maxima.
- Determination of the power maximum in the event of an asymmetric load.

Venue	Duration	Date
Faridabad	01 Day	Mutually Agreed

Who may attend : Professionals from Power Sector, Engineers, Academicians, Equipment Manufacturers, Researchers, Engineering, Managers.

4.12.4 Energy Audit and Loss Reduction in T&D Systems

Objective

To familiarize the engineers with the energy efficiency opportunities available in the various electrical equipments and to help them to prepare better for the BEE Certified Energy Manager Exam.

Outline

- General Introduction – Electrical System.
- Electric motor.
- Compresses Air System.
- HVAC & Refrigeration System.
- Power quality, Harmonics, manifestation measurement, migration.
- Fans & Blowers.
- Pumps & umping System.
- Cooling tower, Lighting System, Diesel Generating System.
- Energy efficient technologies in Electrical Systems.
- Compressed Air Systems.
- Tutorials, Case studies, Labs and Technical visits- This complies with the syllabus of BEE's Energy Manager- Paper-3.

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	03-06-2020
Shivpuri	02 Days	07-01-2021

Who may attend : Engineers from State Electricity Boards/ Power Utilities/corporation, PSU, R&D organizations, Academic Institutions, entrepreneurs & consultations, contractors involved in energy Audit & energy Audit & energy conservation project.

4.12.5 Energy Efficiency in Electrical Utilities

Objective

To familiarize the engineers with the energy efficiency opportunities available in the various electrical equipment and to help them to prepare better for the BEE certified Energy Manager exam.

Program Profile

- General Introduction- Electrical systems.
- Power quality.
- Harmonics- manifestation measurement.
- Mitigation.
- Electric Motor.
- Compressed Air System.
- HVAC & Reprigeration System.
- Fans & Blowers.
- Pumps & Pumping System.
- Cooling Tower.
- Lighting System.
- Diesel Generating System.
- Energy Efficient Technologies in Electrical Systems.
- Tutorials
- Case studies.
- Labs and Technical Visits-this complies with the syllabus of BEE's Energy manger - Paper - 3.

Venue	Duration	Date
PSTI Bengaluru	03 Days	09-09-2020

Who may attend : Engineers form State Electricity Boards, Power Utilities/ Corporations, PSUs, R&D organizations, Academic

institutions, entrepreneurs and consultants/ contractors involved in energy audit and energy conservation projects.

4.12.6 Energy Conservation and Energy Audit (For Generation Sector)

Objective

To infuse the energy saving consciousness of the participants highlighting the energy losses in the power industry that are usually unnoticed in the various areas of operations and acquainting them with the energy saving methods and the benefits achieved.

Program Profile

- Potential areas in the Power Industries for energy saving.
- Energy Saving methods with typical examples and exercises for power stations.
- Ways to minimise losses in power transmission & distribution system.
- Better use of electrical energy.
- Proper storage and use of fuel.
- Waste Heat areas and their utilization.
- Co-generation techniques for energy boosting.
- Energy Management System, energy Auditing and their implementation techniques for power industries.

Venue	Duration	Date
Neyveli	03 Days	01-03-2021
Guwahati	03 Days	13-07-2020
Nagpur	03 Days	25-11-2020
PSTI Bengaluru	03 Days	04-11-2020
Shivpuri	03 Days	01-03-2021

Who may attend : Engineers with 3-4 years experience in Thermal Power Stations.

4.12.7 Energy Audit & Demand Side Management in Power Utilities

Objective

To acquaint the participants with techniques and methodologies of energy audit & Demand Side Management in Power Utilities.

Program Profile

- Energy Scenario in the country and scope of energy conservation.
- Energy Losses—An Integrated optimal strategy for reduction of T&D Losses.
- Demand forecasting techniques.
- EMS & LMS and Role of Energy Managers.
- DSM Techniques.
- DSM Methodologies.
- DSM through Loss Reduction in Primary and Secondary Distribution System.
- Need for Energy Audit and Audit Procedures.
- Energy Audit – Macro Level & Micro Level.
- HT - Metering & Metering Technique.

Venue	Duration	Date
Neyveli	03 Days	19-10-2020
Shivpuri	03 Days	19-10-2020

Who may attend : Engineers with 3-4 years experience in Thermal Power Station.

4.12.8 Big Data Analytics & Data Science Training covering descriptive, prescriptive & predictive analytics hands on case studies with Industrial orientation (Energy & Utility)

Objective

Today's technologically - driven society, terabytes of data is being generated every day. Businesses have information about their customers, suppliers, products, subscribers and everyone else they have interaction with. Traditionally, business intelligence has been helping firms analyze their historical data. However, tables turned when Data Analytics gave the power to predict events and suggest actions. What to do with that information, and how to mine it for trends, insights and predictors of future behaviour, has increasingly become a key driver for a successful business. Due to its potential,

the past few years have witnessed a phenomenal growth in the reach of data analytics. Big Data Analytics is basically looking for two types of people – those who can channelize large amount of information and those who can translate business problems to analytical problems, while the ability to communicate remains intrinsic to both roles. The domain of analytics is going to be immensely lucrative for young professionals with the right skills, aptitude and attitude. As more and more businesses and government organizations across the world are going to put their faith in data-driven decisions, a plethora of roles are emerging in this – such as Internet of Things (IoT) architect, marketing technologist, technology broker and chief data officer apart from the in demand roles like Data Scientists, Data Engineers, Big Data Analysts, Data Strategist, Data Architect, Data Visualization Analyst, Data Quality Manager etc. Recent Industry salary reports indicate that there is 32% increase in demand with people having Analytics qualifications over and above degrees in IT or business administration or even doctorates (2016) and data scientists earn more than CA's & engineers. A well-trained business analyst is going to be a much sought-after professional in the foreseeable future.

Venue	Duration	Date
Faridabad	01 Week	08-04-2020 08-07-2020 14-10-2019 16-03-2021
Shivpuri	03 Days	20-05-2020

Who may attend :

4.12.9 Efficiency Improvement Measures in Distribution Systems

Objective

To acquaint the participants with techniques and methodologies of DSM Techniques& Demand Side Management in Power Utilities

Outline

- Energy Scenario in the country and scope of energy conservation.
- Energy Losses—An Integrated optimal strategy for reduction of T&D Losses.
- Demand forecasting techniques.
- EMS& LMS and Role of Energy Managers.
- DSM techniques.
- DSM Methodologies.
- DSM through Loss reduction in Primary and Secondary Distribution System.
- Need for Energy Audit and Audit Procedures.
- HT - Metering & Metering Technique.
- Field Visits.

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	10-08-2020

Who may attend : Engineers working in the area of Distribution System.



Tree Plantation by Director General at NPTI Shivpuri

4.13 POWER MANAGEMENT AND MANAGEMENT DEVELOPMENT PROGRAMS

4.13.1 Regulatory Framework in Power Sector

Objective

To familiarize the participants from Power Transmission and Distribution System regarding safety requirements, regulation of power station.

Program Profile

- Electricity Act 2003- legal framework, national electricity policy and tariff policy.
- Energy Conservation Act/Indian Electricity Grid Code, Regulations and Grid standards-Regulations 2010.
- CEA Regulations, connectivity, metering, construction of electrical lines, AT & C losses.
- Procedures, grant of approval for interstate transmission of power.
- Terms and conditions for Short term open access.
- Renewable energy generation regulations.
- Renewable energy scheduling, dispatch and deviation settlement - Regulations 2015.

Venue	Duration	Date
Durgapur	02 Days	07-01-2021
Shivpuri	03 Days	03-02-2021

Who may attend : System Operators from SEBs, Power Utilities/ Corporation, PSU, R&D Organization, Academic Institution.

4.13.2 Regulatory Issues in Power Sector

Objective

The objective of this course is to create awareness and understanding of regulatory issues in power distribution amongst the Middle level management officials in Distribution Utilities and SRECS throughout India.

Program Profile

The course will include topics that directly address regulatory approaches aimed at enhancing the financial health of the Distribution Utilities by:

- Controlling Aggregate Technical and Commercial (AT&C) Losses.
- Improving efficiency.
- Improving the quality and reliability etc., of customer service.
- Economic, legal, and social rationale for electricity regulation.
- Role of regulation under the new legislation and economic environment.
- Types of regulation and making approaches.
- Regulation of quality of electricity supply and services.
- The role of the Middle Management executives of the utilities under independent regulatory framework.

Venue	Duration	Date
Faridabad	05 Days	Mutually Agreed

Who may attend : Executive Engineer, Assistant Engineer, Deputy/Accounts Officer (or) any other equivalent rank mentioned above.

4.13.3 Open Access, Power Trading and Tariffs - ABT Scenario

Objective

To familiarize the executive of power system Utilities and Open Access, Exchanges, Tariffs etc.

Outline

- Open Access in Transmission & Distribution.
- Electricity Act Provisions.
- Power Trading in Multi buyer and multi seller environment.
- Availability based tariff concept and importance.
- Balancing and settlement mechanism.
- Power trading rules in changed scenario.
- Role of Regulatory Commissions.
- Open Access challenges for Power Market.
- Power Exchanges and its functioning.

- Field visits/Demonstration.

Methodology

Lectures, field visits, lab sessions.

Venue	Duration	Date
PSTI Bengaluru	03 Days	29-07-2020

Who may attend: Engineers with 2-3 years experience in power trading activity system operations from SEB's/power utilities/corporations/PSU's R&D organization, Academic Institutions.

4.13.4 Management Development Program

Objective

To provide basic know-how of management.

Program profile

- Introduction of Management Skills.
- Effective Communication.
- Motivation.
- Quality Leadership.
- Team Building.
- Case Studies.

Venue	Duration	Date
Alapuzzaha	01 Week	Mutually Agreed
Nangal	01 Week	08-06-2020

Who may attend : Officers/Engineers working in Power Sectors and allied industries with 2-3 years of experience.

4.13.5 Training For Trainers

Objective

To enable the trainers in Power Sector to increase their knowledge and skill to impart training in operation and maintenance of power station.

Program Profile

- Fundamentals of learning process.
- Group communication.
- Motivation and transactional analysis.
- Identification of training program.
- Design of training program.
- Training resource development.
- Training programs co-ordination technique.
- Instructional techniques.
- New techniques.
- On-job, On-site methodologies.
- Evaluation, validation and record keeping.
- Feed-back technique.

Venue	Duration	Date
Alapuzzaha	01 Week	Mutually Agreed
Badarpur	01 Week	06-07-2020

Who may attend : Engineers as well as non technical managers involved in human resource development.

4.13.6 Management of Renewable Energy (Solar Energy in Particular); Finance and Economics of Renewable Energy

Objective

- Understanding Management of Renewable Energy Integration with Grid, Solar Energy in Particular, and Techniques for Grid Balancing.
- Understanding Policies and Finances of Renewable Energy.

Programme Profile

- Introduction to various forms of Renewable Energy Generation, Solar Energy in Particular.
- Managing Integrity of Renewable Energy to the Grid, Balancing of Grid, Concept of Smart Grid.
- Design aspects of installation of mini/micro Grid Solar Power Plant, Technical & Administrative Issues.
- Introduction to Renewable Energy Finance.
- Tariff Support Schemes.
- Project Finance Calculations.
- Basic Technical Calculations.
- Government Policy and Support Schemes.
- Project Finance Examples with Case Studies.

Venue	Duration	Date
Alapuzzaha	02 Weeks	Mutually Agreed
Guwahati	02 Weeks	14-09-2020

Who may attend : Individuals considering a consultancy job and/or those who have to evaluate the benefits of adopting renewable energy technology. Industrialists/Entrepreneurs intending to invest in the Renewable Energy Sector. Working Technical Executives from various Power Sector Stake-Holders and Load Dispatch Centres.

4.13.7 Finance for Non Finance Executives

Objective

To impart fundamental about financial practices amongst non-financial personnel.

Program Profile

- Financial Statements - To study Profit & Loss Account and Balance Sheet as well as Cash Flow Analysis and to understand every term of these statements.
- Financial Statement Analysis - To study Ratio Analysis and to assess the financial health of an organization Cost, Selected Cost Terms and Cost Estimation through Overhead Allocation Cost Analysis and Decision Making Financing and the Estimation of the Cost of Capital Investing and the Estimation of Risk Associated.
- Working Capital Management Capital Expenditure Decisions.

Venue	Duration	Date
Alapuzzaha	02 Days	Mutually Agreed
Durgapur	02 Days	20-08-2020

Who may attend : All technical and administrative personnel with 2-3 years experience.

4.13.8 Development of Finance Managers

Objective

To impart in-depth knowledge to Finance Officers in Budgeting & Financial Statement Analysis Industry working in Power Supply Industry.

Program Profile

- Status & Responsibilities of Finance Executives – Development of Managerial Skills.
- Capital Investment decisions; strategic Considerations.
- Budgeting & Accounting (Accounting Statements and records).
- Financial Statement Analysis.
- Taxation – Rules & Regulations.

Venue	Duration	Date
Alapuzzaha	01 Week	Mutually Agreed
Faridabad	01 Week	Mutually Agreed

Who may attend : Finance Officer working in Power Stations/ Industry with 5 to 10 years of experience.

4.13.9 Contract Management

Objective

To develop the Engineers / Finance Professionals / Executives regarding procurement procedure and up-to-date information.

Program Profile

- Purchase & Contract Management.
- Key Issues.
- On generation of Indent to Placement of Orders and Closing of Contract.
- E-Procurement and guidelines.
- Benefits of E-procurement over Off-line system of procurement.
- E-tendering.
- Some case studies and analysis.
- Quality Assurance Philosophy.
- Integrated Management System.
- ISO 9001 & ISO 18001 regarding OHSAS, ISO-14000 regarding EMS.

Venue	Duration	Date
Alapuzzaha	02 Days	Mutually Agreed
Durgapur	02 Days	18-05-2020
Shivpuri	03 Days	04-05-2020

Who may attend : Finance Executives, Engineers, Management

Level Executives with 2-3 years experience.

4.13.10 Behavioral Science

Objective

To develop personality, skills, team building, value and ethics in work life.

Program Profile

- Freuds theory of personality.
- Ice Breaker and warm up activities.
- Personnel Effectiveness and Behavioral skills.
- Personality development – Case Study.
- Evaluation and Human Behavior.
- Models of Human Behavior.
- Activity of Personnel effectiveness and leadership.

Venue	Duration	Date
Alapuzzaha	02 Days	Mutually Agreed
Durgapur	02 Days	08-02-2021
Shivpuri	02 Days	24-06-2020

Who may attend : Jr. Level, Middle Level, Supervisor Level & Executives (Technical & Non-Technical).

4.13.11 Maintenance Planning & Cost Control

Objective

To enable the participants to understand and apply the modern planning and cost control techniques in maintenance programs.

Program Profile

- Aims and objective of maintenance efficient, service, high plant availability, maintenance and planning engineer's duties.
- Integration of maintenance with operational requirements, plant reliability, plant outages and daily work programs.
- Preventive maintenance of running units.
- Planning of major plant overhauls during shut downs.
- Planning techniques-critical path analysis, charting systems etc.
- Purchasing and stores control-standards, cost codes, control of stores and store records.
- Cost control, Direct costs, indirect costs, outage costs, budgeting and costing works, budgetary control.
- Contract procedures, Conditions of contract, project evaluation, interest and depreciation charges.
- Use of computers in maintenance planning.

Venue	Duration	Date
Alapuzzaha	03 Days	Mutually Agreed
Shivpuri	03 Days	09-12-2020

Who may attend: Engineers/Officers working in Power Stations/ Industries with 5-10 years experience.

4.13.12 Electricity Act and Regulation

Objective

To appraise of the participants about the conceptual reorientation in IEA-2003 related to generation, transmission, distribution along commercial implication.

Program Profile

- Over view of IEA-2003.
- Electricity Grid Code.
- Status of Deregulation and Power Tariff.
- Open access and ABT

Venue	Duration	Date
Mutually Agreed	03 Days	

4.13.13 Training for Assistant Level Persons/ Personnel Staff

Objective

To impart skills to personnel staff working in Power Supply Industry.

Program Profile

- General Administration Rules & Regulations.
- Office Procedure, Etiquettes, Management of official records, Noting & Drafting.
- Practice of stenography and test at qualifying speed of 80 WPM.
- Basic of computers, typing on computers with a qualifying speed of 40 WPM.

- Hands-on practice on computers with Word, Excel and other basics.
- Communication and Communication skills.
- Time Management and Stress Management.

Venue	Duration	Date
Alapuzhaha	01 Week	Mutually Agreed
Faridabad	01 Week	Mutually Agreed

Who may attend : Personnel staff working in Power Stations/ Industry with 2 to 6 years of experience.

4.13.14 Government e-Marketplace (GeM) and General Financial Rules (GFR) 2017

Objective:

The 5-Day program will enable the participants to:

- Gain an overall understanding of the Government e-Marketplace (GeM) and General Financial Rules 2017.
- Understand how GeM and GFRs 2017 would impact the functioning of your organisation and changes in the procurement process required for compliance.
- Acquire practical knowledge of the different procurement procedures required under GFRs 2017 and GeM such as Registration of Organization, Creation of User Accounts, Placement of Order for Good & services, Receipt of Goods, PRC/ CRAC, Bidding and Reverse Auction.

Venue	Duration	Date
Faridabad	1 Week	05-10-2020
Shivpuri	1 Week	05-10-2020

Who may attend :

4.13.15 Human Resource Development Program for Finance Officer/ Manager

Objective

To develop Human resources deployed in finance wing who are working in Power supply Industry.

Program Profile

- Personality Development – Skills
- Attitudinal Development, Leadership, Team Building, Value & Ethics.
- Business Communication skills, Negotiation.
- Man Power Planning (MPP).
- Beyond the Present Role: Potential Systems.
- Quality of work Life (QWL).

Venue	Duration	Date
Alapuzhaha	03 Days	25-11-2020
Faridabad	01 Week	Mutually Agreed

Who may attend : Finance persons working in Power Stations/ Industry with 5 to 10 years of experience.



Two Days Training Program on 'Battery Energy Storage System' at Continental Carbon India Limited, Ghaziabad



12 Weeks Suryamitra Course participants at work National Power Training Institute, North Eastern Region, Guwahati

4.14 ENVIRONMENTAL MANAGEMENT

4.14.1 Environmental Issues in Thermal Power Stations and FGD Technology

Objective

To inculcate awareness and necessity of sustainable development through better operational and environmental practices employing new clean technologies.

Program Profile

- Introduction to air and noise pollution.
- Noise and air pollution control legislation.
- Nature of air and noise pollution and its effect including pollution control methodology.
- FGD Technology for flue gas treatment.
- Noise and air pollution measurements & Control mechanisms including few case studies like Bhopal and green tribunals.
- Introduction to water pollution monitoring and analysis.
- Effect of water pollution, pollution control legislation.
- Removal of pollutants from waste water – sewage and sludge treatment.
- Zero discharge concepts Case studies of water pollution control implementation.
- Method of Environment Impact.

Venue	Duration	Date
Alapuzzaha	02 Days	Mutually Agreed
Durgapur	02 Days	03-12-2020
Shivpuri	02 Days	08-10-2020

Who may attend : Junior / Senior Engineers of any process and power plant, Operational personnel Policy makers with 2-3 years experience.

4.14.2 Environmental Pollution & Pollution Control Related to Power Plants Engineering

Objective

To give concise ideas about various Pollutants in power stations and measurement & control of pollution.

Program Profile

- General description of different types of Industrial Pollution.
- Introduction to Air, Water and Noise Pollution.
- Nature of Air Pollutants.
- Water quality and health.
- Role of air and Noise Pollution control in modern society.
- Pollution control theory.
- Noise & Air Pollution Measurement & Equipment, the role of waste water treatment and the removal of Toxic Pollutants.

- Sewage and sludge treatment.
- Effects of pollutants in the Aquatic environment.
- Evaluation Pollution Effects on Plant Productivity.
- Legislation and the control of Air, Noise and Water Pollution.

Venue	Duration	Date
Alapuzzaha	03 Days	Mutually Agreed
Badarpur	01 Week	13-07-2020
Nagpur	03 Days	17-02-2021

Who may attend : Engineers/Chemists working in process Industry/ Power Stations.

4.14.3 Air Pollution Monitoring & Control Technologies

Objective

To impart and disseminate the knowledge to the participants about air pollution control & monitoring techniques adopted in various industries.

Program Profile

- Basics of Air pollution control.
- Combustion control & No, Reduction.
- Dust Collector Mechanisms.
- Flue Gas desulphurisation.
- Denitrification of Exhaust Gas.
- Toxic Gas Treatment.
- Measurement of Air Pollutants.
- Environment monitoring system.
- Environment Impact Assessment Test.

Venue	Duration	Date
Neyveli	02 Days	08-10-2020 07-01-2021

Who May attend : Engineers/ Managers/ Researcher/PG student

4.14.4 Environmental Impact Assessment and Environment Management Plan

Objective

To Familiarize Power Engineers about various Impact and assessment of Environment on large Thermal Power Plants

Program Profile

- Methods for Environment Impact Assessment.
- Analysis of Environment Management Plant.
- Intepreation of Environment and Impact Assessment.

Venue	Duration	Date
Badarpur	01 Week	Mutually Agreed
Durgapur	03 Days	Mutually Agreed

Who May attend : Engineers/Faculties/ Research Scholars/ PG students.



Three Weeks Training Program on Gas Turbine Power Plants for Libeyan Nationals at NPIT Faridabad

4.15 OTHER TRAINING PROGRAMS AS PER THE REQUIREMENT OF CLIENT ON MUTUALLY AGREED BASIS

- | | |
|---|---|
| 4.15.1 Training Mind for Excellency | 4.15.26 Managing Carbon Credit of TPS through CDM Route |
| 4.15.2 Executive/Management Development Programs for Executives & Supervisors | 4.15.27 Power Distribution Management |
| 4.15.3 Executive Development Program for Law Stream | 4.15.28 Fuel (Coal & Oil) Handling System Operation |
| 4.15.4 HR for Non-HR Executives | 4.15.29 Material Management |
| 4.15.5 Environmental Management | 4.15.30 Fluidised Bed Combustion Boilers |
| 4.15.6 Hydropower Plant Protections | 4.15.31 Advances in Power Plant Chemistry for Chemists |
| 4.15.7 Planning and Cost Control of Hydro Electric Power Station | 4.15.32 Distribution Franchise |
| 4.15.8 Control & Instrumentation of Hydro Electric Power Station | 4.15.33 Grid Management |
| 4.15.9 Construction equipment of Hydro Electric Plants | 4.15.34 Power Exchange and Power Trading |
| 4.15.10 Environmental Impact Assessments | 4.15.35 Power Market Regulations |
| 4.15.11 Transformers & Electrical Equipment in Hydro power Plants | 4.15.36 Industrial Safety |
| 4.15.12 Constructional details of Hydro Turbines & Generators | 4.15.37 Energy Market Management |
| 4.15.13 Erections of Hydro Turbines, Generators and Auxiliaries | 4.15.38 Reactive Power Management |
| 4.15.14 Types of Dams & their Constructional Details | 4.15.39 Artificial Intelligence |
| 4.15.15 Time Management | 4.15.40 Finance and Economics of Renewable Energy |
| 4.15.16 Leadership Skills and Stress Management | 4.15.41 Electricity Act and Regulation |
| 4.15.17 Leadership Skills | 4.15.42 Project Management |
| 4.15.18 Project Management | 4.15.43 Customer Relationship Management |
| 4.15.19 Customer Relationship Management | 4.15.44 Financial Management in Power Sector |
| 4.15.20 Financial Management in Power Sector | 4.15.45 Total Productive Maintenances |
| 4.15.21 Total Productive Maintenance | 4.15.46 Change in Attitude |
| 4.15.22 Change in Attitude | 4.15.47 Grid Management |
| 4.15.23 Contract Management | 4.15.48 Power Exchange and Power Trading |
| 4.15.24 Pump Storage Hydro Power Station | 4.15.49 Power Market Regulation |
| 4.15.25 GIS/GPS for Power Utilities | 4.15.50 Industrial Safety |
| | 4.15.51 Any Other Training Program as Per Customers Requirement |



Participants of One Day Workshop on “Integrated Approach for Cyber Security in Power Sector” organised by NPTI neyveli at Chennai

5. ONLINE TRAINING COURSES

5.1 Solar Energy Technology: Fundamentals and Applications

Objective

This course gives a comprehensive overview of the PV technology and is apt for working professional who wish to upgrade their skills.

Program Profile

- Introduction to solar energy.
- The sun and solar energy.
- I Vs. V Characteristics for solar cells.
- Models of solar PV cells.
- DC-DC converters.
- Boost and Buck-Boost converters.
- Operation of PV modules with load.
- Fundamentals of MPPT.
- MPPT algorithms.
- Single phase inverter.
- Three phase DC-AC inverters.
- Voltage control of DC-AC inverters using PWM.
- Interface of PV modules with grid.
- PV systems with battery storage.
- PV connection issues.
- PV Instrumentation fundamentals.
- PV sensors and instruments.
- Grid code for PV systems.
- Batteries energy storage.
- Sizing of PV systems: Stand-alone with battery.
- Stand-alone with battery for homes: A case study.
- Solar PV hybrid systems.
- Environmental impact of solar PV systems.
- Hybrid solar thermal power plants

Duration : 12 Weeks

Who may attend : 3rd year and 4th year engineering students and is equivalent to 3 credit.

To register please go to the following link: <http://117.239.178.82/account/register.php>

5.2 E - Mobility and Charging Infrastructure Objective

This course gives a comprehensive overview of the e- mobility and charging infrastructure and is apt for working professional who wish to upgrade their skills.

Program Profile

- EVs : A clean mobility option.
- Motion and dynamic equations for vehicles.
- Propulsion requirements for vehicles.
- HEV architectures.
- EV architectures.
- Mechanical systems used in EVs and HEVs.
- Fundamentals of Regenerative Braking.
- Electrical machines for EVs and HEVs.
- DC-DC Converters.
- Boost and Buck-Boost Converters.
- Multi Quadrant DC-DC Converters.
- Voltage Control of DC-AC Inverters Using PWM.
- Control Systems for the HEV and EVs.
- The fuzzy logic based control system.
- Batteries for EVs.
- Fuel cell and supercapacitors.
- Electric vehicle charger.
- Electric vehicle charger technology.
- The EV charging station architecture.
- EV chargers and portfolio management.
- EV charging and the grid.
- Smart grid and EVs .

Venue **Duration** **Date**

Shivpuri 12 Weeks 02 Days 12-11-2020

Who may attend : 3rd year and 4th year engineering students and is equivalent to 3 credit.

To register please go to the following link: <http://117.239.178.82/account/register.php>



Participants of 'Two Weeks Induction Training Program' for JE (Civil) of Bihar State Power (Holding) Co. Ltd. from 25.11.2019 to 06.12.2019 at NPIT (NR) Badarpur



Inauguration function of 5 weeks Induction training program of Asstt. Engineer Trainees (AETs) of Powergrid, NERTS, Shilling on 09-12-2019 at National Power Training Institute, North Eastern Region, Guwahati

6. SKILL DEVELOPMENT TRAINING PROGRAMS

NPTI has been empanelled as a Government agency with Ministry of Rural Development (MoRD) for conducting NSQF aligned training program on all India basis for Power Sector & Renewable Energy Sector vide notification no. 5/2019, dated: 26.02.2019 and the MoU has been signed with MoRD on 04.04.2019.

Vide Gazette notification No. 449, F. 43001/02/2013-NSDA, dated 05.12.2019 of Ministry of Skill Development And Entrepreneurship and 23rd meeting of NSQC held on 22.08.2019, NPTI has been recognised as an Assessment & Certification body for 60 Qualifications in Power Sector and Renewable Energy Sector. List of qualifications is given below:

6.1 Power Sector

S. No.	Qualification File	Qualification Code	NSQF Level
1.	Assistant-Electricity-Meter-Reader-Billing-and Cash-Collector	PSS/Q3001	3
2.	Assistant-GIS-Mapping-Power-Distribution	PSS/Q3006	3
3.	Assistant-Technician- Street Light Installation & Maintenance	PSS/Q3003	3
4.	ATS-Power Electrification		5
5.	Assistant Sub-Station (66/11,33/11KV)	PSS/Q3002	3
6.	Cable Joints (ATS)		5
7.	Cable Joints Electrical Power System	PSS/Q1002	4
8.	Consumer Energy Meter Technician	PSS/Q0107	3
9.	Distribution Linemen	PSS/Q30102	4
10.	Electrical Winder		2
11.	Electrician (CTS)	DGT/1001	5
12.	Electrician Domestic		2
13.	Electrician Domestic Solutions	PSS/Q6001	3
14.	Electrician Industrial		3
15.	Electrician (Steel Plant) (ATS)		5
16.	Electrician Transmission Line		2
17.	Engineer - Power Distribution	PSS/Q7001	6
18.	Junior Engineer (JE)- Power Distribution	PSS/Q3004	5
19.	Linemen (ATS)		5
20.	Lineman Construction - Distribution	PSS/Q0108	4
21.	Lineman Distribution (Multi Skilled) PSS/Q2011		4
22.	Mechanic (HT, LT Equipments and Cable Jointing (ATS))		5
23.	Power Electrician (ATS)		5
24.	Senior Lineman-Distribution	PSS/Q0103	5
25.	Stream Turbine Cum Auxiliary Plant Operator (ATS)		5
26.	Technician Helper (Distribution)	PSS/Q0101	2
27.	Technician Distribution Transformer Repair	PSS/Q3003	4
28.	Wireman (ATS)		5
29.	Wireman (CTS)	DGT/1009	4



Training Personnel at HLTC, Bengaluru for Live-Line Maintenance

6.2 Renewable Energy Sector

S. No.	Qualification File	Qualification Code	NSQF Level
1.	Solar PV Installer – Civil	SGJ/Q0103	4
2.	Solar PV Installer (Suryamitra)	SGJ/Q0101	4
3.	CTS - Solar PV Installer – Electrical	SGJ/Q0102	4
4.	Solar Electric System Installer and Service Provider	RNE701	3
5.	Rooftop Solar Grid Engineer	SGJ/Q0106	5
6.	Solar Proposal Evaluation Specialist	SGJ/Q0105	7
7.	Solar LED Lighting Product (Design and Manufacturing)	NL/M/L4/C022	4
8.	MES - Solar PV Technician	RNE805	3
9.	Manufacturing Assistant - Solar Hot water System	RNE703	3
10.	MES - Solar Hot water System Installation and Service Technician	RNE702	3
11.	CTS - Solar Technician Electrical	DGT/1126	4
12.	Solar PV Business Development Executive	SGJ/Q0107	5
13.	Solar PV Structural Design Engineer	SGJ/Q0109	5
14.	Solar PV Designer	SGJ/Q0110	7
15.	Solar PV Project Helper	SGJ/Q0111	2
16.	Solar PV Engineer (option: Water pumping System)	SGJ/Q0112	5
17.	Solar PV project manger (E & C)	SGJ/Q0114	7
18.	Solar PV Maintenance Technician – Electrical (Ground Mount)	SGJ/Q0115	4
19.	Solar PV Maintenance Technician – Civil (Ground Mount)	SGJ/Q0116	4
20.	Solar Lightening Technician (Options: Home Lightening system/ Street Light)	SGJ/Q0201	4
21.	Solar PV Manufacturing Technician	SGJ/Q0119	4
22.	Recyclable Waste Collector and Segregator	SGJ/Q6101	4
23.	Safai Karamchari	SGJ/Q6102	3
24.	Waste Picker	SGJ/Q6103	3
25.	Waste Water treatment Plant Helper	SGJ/Q6602	4
26.	Waste Water treatment Plant Technician	SGJ/Q6601	4
27.	Solar power plant installation, Operation and maintenance, petty contractor, Solar product retailer		5
28.	Certification Course in : Sustain and enhance technical knowledge in Solar energy Systems		5
29.	Certification Course on Laboratory Technicians for energy efficiency, Star labelling and other electrical testing for environmental criteria		6
30.	Solar PV System Installation Engineer	ELE/Q5902	5
31.	Solar & LED Technician (Electronics)	ELE/Q5902	4



Training Program on 'Big Data Analytics & Data Science for Power Utilities' from 8th – 12th July, 2019 at NPTI Faridabad

7. FEE STRUCTURE FOR VARIOUS TRAINING PROGRAMS OF NPTI FOR THE YEAR 2020 – 2021

International Training Programs Fee Structure

S.No.	Course	Course fee (All Foreign Countries)
1.	Regular Course on Power Plant Engineering	US \$ 800 per week per participant subject to maximum of US \$ 20000 up to 52 weeks duration
2.	Simulator Training	US \$ 1500 per week per participant
3.	Boarding & Lodging in NPTI Hostel	US \$ 500 per week per participant (AC Rooms on single sharing basis)
4.	Specialized need based Tailor made courses	As per estimate

Domestic Training Programs Fee Structure

Hot Line Training Centre, Bengaluru, Regular Programs – Residential			
S. No.	Name of the Course	Duration	*Training Fee (₹) per participant
1.	Live Line Maintenance Techniques (LLMT) using Hot Stick Method	11 weeks	1,86,000
2.	Live Line Maintenance Techniques (LLMT) using Bare Hand method (BHM)	05 weeks	1,45,000
3.	Switchyard Maintenance Techniques using LLMT for Linemen/ Supervisors	04 weeks	1,15,000
4.	Familiarization Training Programme on 400 kV cold Lines	04 weeks	87,000
5.	Awareness Course for Executives in Hot Line Activities	01 week	22,000
6.	Live Line Punctured Insulator Detection (PID)	01 week	24,000
7.	Live Line Insulator Washing Techniques (LLIW)	04 days	24,000

*Training Fee includes Boarding and Lodging Charges

NOTE: GST or any other tax as applicable shall be charge extra on various components like training fee, Boarding & Lodging Charges, Transportation Charges.

A. Simulator Training Fee Structure		
Name of the Simulator	Duration	*Training Fee (₹) / Participant
Thermal Simulator- 210 MW/500MW/800MW**	1 week	25,000
CCGT 430 MW/ CCGP 550 MW Simulator	1 week	25,000
Hydro Simulator 250 MW	1 week	20,000
Power System Training Simulator	1 week	24,000
SCADA & Smart Grid	1 week	35,000
Multi-Functional Simulator		
a) Combo Offer (Thermal- 210 MW/500MW/800 MW)**	3 weeks	60,000
b) Integrated Offer of 5 Simulators (Thermal- 210 MW/500MW/800 MW**, Hydro 250 MW and SCADA & Smart Grid)	5 weeks	90,000
c) Integrated Offer of 6 Simulators (Thermal- 210 MW/500MW/800 MW**, CCGP-430 MW/550 MW, Hydro 250 MW and SCADA & Smart Grid)	6 weeks	1,00,000

*Training Fee Includes Tea/ Snacks and working lunch

** Supercritical Technology Training of 660 MW Power Plant may also be imparted

S. No.	Name of the Course	Duration	Training Fee (₹) per participant
B. Industry Interfaced / Long Term Courses (Period 17 to 52 Weeks)			
1	Post Graduate Diploma Course (PGDC) in Power Plant Engineering*		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000
2	Post Graduate Diploma Course (PGDC) in Renewable Energy and Grid Interface Technologies		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000
3	Post Graduate Diploma Course (PGDC) in Smart Grid Technologies		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000
4	Post Graduate Diploma Course (PGDC) in Energy Market Management		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000
5	Post Graduate Diploma Course (PGDC) in Power System Operation		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000

6	Post Graduate Diploma Course (PGDC) in Sub-Transmission and Distribution*		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000
7	Post Graduate Diploma Course (PGDC) in Hydro Power Plant Engineering*		
	i) Non-sponsored candidates	39 weeks	1,75,000
	ii) Sponsored candidates	39 weeks	2,00,000
8	Post Graduate Diploma Course (PGDC) in Transmission and Distribution System*		
	i) Non-sponsored candidates	26 weeks	1,45,000
	ii) Sponsored candidates	26 weeks	1,90,000
9	Post Diploma Course (PDC) in Thermal Power Plant Engineering*		
	i) Non-sponsored candidates	52 weeks	1,45,000
	ii) Sponsored candidates	52 weeks	2,20,000
10	Post Diploma Courses (PDC) in Hydro Power Plant Engineering		
	i) Non-sponsored candidates	26 weeks	80,000
	ii) Sponsored candidates	26 weeks	1,35,000
11	Post Diploma Courses (PDC) in Distribution & Substation Management		
	i) Non-sponsored candidates	26 weeks	80,000
	ii) Sponsored candidates	26 weeks	1,35,000
12	Post Diploma Courses (PDC) in Transmission Line Maintenance		
	i) Non-sponsored candidates	26 weeks	80,000
	ii) Sponsored candidates	26 weeks	1,35,000
13	Graduate Engineers Course (Power Plant Engineering)		
	i) Non-sponsored candidates	52 weeks	2,30,000
	ii) Sponsored candidates	52 weeks	3,60,000
14	Certificate Course "Regulatory Framework & Commercial Aspects" of Indian Power Sector		
	i) Non-sponsored candidates	26 weeks	80,000
	ii) Sponsored candidates	26 weeks	1,35,000
C. Medium Term Courses (Period 5 to 16 Weeks)			
15	Specialized Courses	16 weeks	1,44,000
16	Specialized Courses	15 weeks	1,38,000
17	Specialized Courses	14 weeks	1,32,000
18	Specialized Courses	13 weeks	1,26,000
19	Specialized Courses	12 weeks	1,20,000
20	Specialized Courses	11 weeks	1,14,000
21	Specialized Courses	10 weeks	1,08,000
22	Specialized Courses	09 weeks	1,01,000
23	Specialized Courses	08 weeks	94,000
24	Specialized Courses	07 weeks	87,000
25	Specialized Courses	06 weeks	78,000
26	Specialized Courses	05 weeks	69,000
D. Short Term Courses** (Period 1 Day to 4 Weeks)			
27	Specialized Courses	04 weeks	57,000
28	Specialized Courses	03 weeks	45,000
29	Specialized Courses	02 weeks	33,000
30	Specialized Courses	01 week	18,000
31	Specialized Courses	04 days	16,000
32	Specialized Courses	03 days	13,000
33	Specialized Courses	02 days	9,000
34	Specialized Courses	01 day	5,000
35	On-site/ On-plant training programs	01 week	30,000
36	On-site/ On-plant training programs	04 days	27,500
37	On-site/ On-plant training programs	03 days	22,000
38	for On-site/ On-plant training programs	02 days	15,500
39	for On-site/ On-plant training programs	01 day	8,500

* Includes Thermal Training Simulator Training Fee of 2 weeks/ CCGT Simulator Training Fee of 2 weeks/ Hydel Simulator Training Fees of 1 week/ Power System Training Simulator Fee of 1 week as applicable.

** In respect of short term courses, fee is inclusive of tea/ snacks and working lunch. In respect of other courses, fee is exclusive of tea/ snacks and working lunch. GST shall be charge extra.

Note: For specialized courses/ on-site/ on-plant training programs, minimum number of participants should be 10. If number of participants is less than 10, then fee for 10 participants will be charged.

8. WORKSHOPS AND SEMINAR

To keep in the pace with advancements in technology, NPTI organises numerous Workshops/Seminars/Conferences round the year to provide a platform for knowledge sharing and training. Following programs have been scheduled for the year 2020-2021.

S. No.	Name	Date	Organising Institutes
April 2020			
1.	5 Days Workshop on "PSSE Software (Hands – On)"	20 th to 25 th April, 2020	PSTI, Bengaluru
May 2020			
1	3 Days National Workshop on "DLMS/ COSEM Training & its Applications"	13 th to 15 th May, 2020	PSTI, Bengaluru
2.	3 Days Workshop on Design & Implementation of Floating Solar PV Systems	27 th to 29 th May 2020	NPTI, Alappuzha
June 2020			
1.	Renewable Energy Technologies – Indian Perspective and Challenges	04 th June 2020	NPTI, Nagpur
2.	Cyber Security Issues & Challenges	12 th June 2020	NPTI, Shivpuri
3.	One Day National Workshop on "SCADA Security Issues & its strategic avoidance solution for Transmission Utilities"	19 th June, 2020	PSTI, Bengaluru
July 2020			
1.	One Day Seminar on E Mobility & Its importance in energy storage	10 th July 2020	NPTI, Neyveli
2.	New technologies in Indian Power Transmission sector – Opportunities and Challenges	16 th to 17 th July 2020	NPTI, Nagpur
3.	3 Days National Workshop on "Use of PMU & its components in Transmission Utilities"	28 th to 30 th July, 2020	PSTI, Bengaluru
August 2020			
1.	2 Days Workshop on "IEC61850 Tools & Protocol training with ASE -61850 Suite (Hands - On)"	20 th to 21 st August, 2020	PSTI, Bengaluru
2.	2 Days Workshop on HVDC & FACTS transmission Systems	20 th to 21 st August, 2020	NPTI, Alappuzha
3.	Leadership & Stress Management	21 st August 2020	NPTI, Shivpuri
4.	5 days Workshop on "PSSE Software (Hands - On)"	31 st August to 05 th September 2020	PSTI, Bengaluru
September 2020			
1.	2 Days National Workshop on "Smart Metering Infrastructure for Distribution Utilities"	10 th to 11 th September 2020	PSTI, Bengaluru
2.	Reliability Centered Maintenance (RCM) Planning and heat rate improvement in TPS.	24 th to 25 th September 2020	NPTI, Nagpur
3.	One Day National Workshop on "IoT Cyber Security for Smart Grid"	11 th September 2020	NPTI, Neyveli
October 2020			
1.	2 Days National Workshop on "Future Applications of Smart Grid by using Fuzzy- Neural, Big Data & Clouds"	8 th to 9 th October 2020	PSTI, Bengaluru
2.	One Day National Workshop on "PSSE Software"	16 th October 2020	NPTI, Faridabad
3.	"E- Procurement & GeM"	16 th October 2020	NPTI, Shivpuri
December 2020			
1.	E Mobility & Charging Infrastructure	17 th December 2020	NPTI, Shivpuri
2.	Two days National Workshop "Power System Operation Challenges in New Grid Regulations"	17 th to 18 th December 2020	NPTI, Faridabad
3.	3 Days Workshop on Smart Grid Technologies & E Mobility	21 st to 23 rd December 2020	NPTI, Alappuzha
4.	3 Days Workshop on Large Scale Renewable Energy Grid Integration	23 rd to 25 th December 2020	NPTI Alappuzha
January 2021			
1.	Two Days Seminar on "Demand Side Management for DISCOMs : Latest Trends and Picture"	14 th to 15 th January 2021	NPTI, Faridabad
2.	Grid connected renewable energy systems.	20 th January 2021	NPTI, Nagpur
3.	One Day Seminar on "Renewable Energy Challenges & Opportunities"	29 th January 2021	NPTI, Neyveli
February 2021			
1.	Power Sector Regulatory Issues & Challenges	12 th February 2021	NPTI, Shivpuri
2.	2 Days Workshop on "Supercritical Technologies"	24 th to 26 th February 2020	NPTI, Alappuzha
March 2021			
1.	One Day Seminar on "Big Data Analytics & Data Sciences with Industrial Orientation (Energy & Utility)"	12 th March 2021	NPTI, Neyveli
To Be Announced			
1.	2 Days IEEE PES Global on "Impact of Impact of Innovations in Energy Technologies on Economy"		NPTI, Faridabad
2.	Seminar/Workshop on "Live Line Maintenance on Distribution Lines using Rubber Gloves Method using Arial Vehicle"		NPTI (HLTC), Bengaluru
3.	Workshop on "EV Charging Station"		NPTI (HLTC), Bengaluru
4.	Workshop on "Operation & Maintenance of SF6 Breakers"		NPTI (HLTC), Bengaluru
5.	Workshop on "SCADA & Substation Automation"		NPTI (HLTC), Bengaluru
6.	Workshop on "Recent Developments in Transmission Line & Switchyard Maintenance"		NPTI (HLTC), Bengaluru
7.	Seminar on "Artificial Intelligence"		NPTI (HLTC), Bengaluru
8.	Seminar on "Transmission Line & Substation Maintenance"		NPTI (HLTC), Bengaluru

For all updates regarding Workshops/Seminars/Conferences etc. the interested participants are requested to visit the NPTI website: www.npti.gov.in regularly.



International Conference on Electrical and Electronics Engineering on 28th & 29th February 2020 at NPTI Faridabad



National Conference on Future Scenario and Challenges of Indian Power Sector on 09th & 10th January 2020 at Kolkata



Inauguration of ATAL FDP on "Data Sciences" by Director General at NPTI (S R), Neyveli



Inauguration of Two weeks program from 2nd - 13th December 2019 for 4th Batch of CEA officers at NPTI, HPTI Nangal

9. CONSULTANCY SERVICES

In order to serve the industry requirements and make best usage of infrastructure and expertise, NPTI has been providing consultancy services to various Power Sector Organisations. The salient details are mentioned below.

i) DPRs under R-APDRP, Part-B for the 11th Plan

- Energy & Power Department of Sikkim (2 Towns)
- Purvanchal Vidyut Vitran Nigam limited (PVVNL), Varanasi (29 Towns)
- Tripura State Electricity Corporation Ltd. (TSECL), Tripura (16 Towns)
- Assam Power Development Corporation Ltd. (APDCL), Assam (69 Towns)

ii) Tier-I, Third Party Inspection Agency (TPIA) Quality Inspection Works for Rajiv Gandhi Grameen Vidyut Yojana (RGGVY) for the 10th & 11th Plans

- **Mangalore Electricity Supply Company Ltd. (MESCOM), Karnataka**, for their Chikmagalur & Kadur Districts for 11th Plan
- **Gulbarga Electricity Supply Company Ltd. (GESCOM), Karnataka**, for all their Districts viz., Bidar, Raichur, Koppal, Bellary etc.
- **Hubli Electricity Supply Company Ltd. (HESCOM), Karnataka** for all their 5 Districts viz. Dharwad, Gadag, Haveri, Bijapur & Bagalkot

iii) Other Consultancy Assignments completed

- NPTI provided Consultancy services to **WAPCOS** for preparation of DPR for establishment of Power Training Institute in **Bhutan**.
- NPTI provided Consultancy services to **NHPC** for preparation of DPR for establishment of Hydro Power Training Institute in **Jammu & Kashmir**.
- NPTI in association with TATA Consulting Engineers (TCE) has completed an assignment of preparation of a Feasibility Study for establishing a "National Power Academy" in the Kingdom of **Saudi Arabia**.
- NPTI worked as **REC Quality Monitors (RQM) for Tier – II Inspection of RGGVY works** for the Six (6) states viz., Mizoram, Manipur, Meghalaya, Nagaland, Tripura and Jammu & Kashmir. The assignment included Quality Inspections of Pre-shipment and Village Electrification Works as Rural Electrification Corporation's Quality Monitors (RQM).
- NPTI carried out an assignment of Commercial System Analysis of the Power Distribution Company of **Purvanchal Vidyut Vitran Nigam Ltd. (PuVVNL), Varanasi** for Reduction in Revenue Loss in its various electricity circles.
- Based on the appreciable performance of the assignments carried out **PuVVNL, Varanasi** again awarded Meter Testing, Checking and replacement in its various electricity distribution circles.
- **Bureau of Energy Efficiency (BEE)** awarded a Consultancy Assignment for Training of Master Trainers on "Demand Side Management & Energy Efficiency" for various

DISCOMs in India. The assignment includes visits to various Distribution Utilities across India to assess their training needs and formulate/design syllabus and Course Contents and train the junior & middle management level officers for the best DSM & Energy Efficiency practices for furthering the cause in their respective Distribution Utilities.

- **Dakshinanchal Vidyut Vitran Nigam Ltd. (DVVNL), Agra**, engaged NPTI for Preparation of DPRs of 17 Distribution Circles of DVVNL, comprising 21 Districts of Uttar Pradesh under Integrated Power Development Scheme (IPDS).
- **Dakshinanchal Vidyut Vitran Nigam Ltd. (DVVNL), Agra** engaged NPTI for Preparation of DPRs of 07 Districts of DVVNL of Uttar Pradesh under Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)

iv) Current consultancy work/Projects

- **PMA work in NESCO & WESCO, Odisha:-** NPTI bagged a Consultancy assignment as Project Management Agency (PMA) for DDUGJY & IPDS works in WESCO & NESCO Utility area of OPTCL.
- **IPDS project of APDCL, Assam:-** NPTI has bagged Letter of Award (December 2018) for engagement as Project Management Agency (PMA) for the works under IPDS from Assam Power Distribution Company Ltd (APDCL).
- **NTPC- TPIEA Work:-** NPTI has been awarded the work of Third Party Inspection Agency (TPIA) by NTPC for TPIA Inspection of 15 Districts of Odisha under 12th Plan DDUGJY Projects being implemented by NTPC. NPTI has to conduct inspection of 7000 Villages and submit the reports accordingly to NTPC.
- **PuVVNL - Project Management Agency (PMA)/ Consultant -** NPTI has been appointed as Project Management Agency (PMA)/Consultant to provide services for the works of Unmetered to metered consumers in rural areas of all districts under in PuVVNL to provide complete Project Management services by hand holding the project of PuVVNL, Varanasi DISCOM in the state of Uttar Pradesh under "the works of Unmetered to Metered consumers in rural areas of all districts under in PuVVNL.
- **PuVVNL DPR –** NPTI has been awarded the work for "Preparation of DPR including SCADA system for conversion of HT/LT over head line to undergrounding, erection of DT and electrical connection of consumer from over head to underground and other associated construction work of different area of Varanasi City under Purvanchal Vidyut Vitran Nigam Ltd."
- **Vigilance Inspection of UPPCL–** NPTI has been appointed as an agency to carry out the Third Party Audit of Performance of billing agencies in rural areas of Uttar Pradesh Power Corporation Limited, a holding company of five Discoms viz. Dakshinanchal Vidyut Vitran Nigam Ltd. (DVVNL), Madhyanchal Vidyut Vitran Nigam Ltd. (MVVNL), Paschimanchal Vidyut Vitran Nigam Ltd. (PVVNL), Purvanchal Vidyut Vitran Nigam Limited. (PuVVNL) and KESCO – Kanpur.
- **UPPCL Mainpuri –** NPTI has conducted the work of "Third Party Independent Evaluating Agency for Quality Monitoring (Assurance) work in Saubhagya Scheme in 30 villages of District Mainpuri, Uttar Pradesh".



'DPR for overhead HT/LT Conversion to underground cable work' at Varanasi



10. RESEARCH & DEVELOPMENT

The 30th Report on the subject “**National Electricity Policy - A review**” of the Standing Committee on Energy (2016-17), laid in the Rajya Sabha on 09.08.17 and presented to the Lok Sabha on 10.08.17, while applauding the efforts of NPTI for the electricity sector, lays emphasis that it should venture into other areas of research through its trained manpower. The report suggests that specialized classes in research can be conducted, interactive sessions be organized and demonstration series on achievement be organized by NPTI in areas that would have positive impact on the sector. The Committee strongly recommended NPTI's diversification in activities and concentration on the research segment of the electricity sector for the benefit of the people.

The 2nd Meeting of the Committee, constituted for assessment and review of R&D activities of Organisations/ PSUs under the Ministry of Power under the Chairmanship of Secretary (Power) was held on 19.09.17. The Ministry of Power in its action taken reply agreed with the views of the Committee, that the areas of technological advancement be prioritized and efforts be made to achieve them. The Ministry recommended that NPTI explore collaboration with the industry (IEEMA) for R&D in identified thrust areas.

Subsequently NPTI organized its first R&D Meeting of Power Sector Utilities, Manufacturers, and Academicians on 25.10.17. Reputed academicians and representatives from reputed organizations attended the meeting. It was proposed to create domain specific groups for initiatives in R&D and a lead organization for each such group. NPTI is committed to involve in industry specific research projects in various sub domains of the electricity sector.

1. In the R&D meeting following Groups had been constituted for various R&D activities:
 - a) Thermal Generation – Led by NTPC
 - b) Hydro Generation – Led by NHPC
 - c) Transmission – Led by PGCIL
 - d) Power Distribution – Led by National Smart Grid Mission (SCOPE TYM Pvt. Ltd. can be added in the Distribution Group)
 - e) Renewable Energy – Led by NISE (other members may be PGCIL, NSGM, NHPC, NTPC, CEA, TERI, NIWE, NIBE etc.)
 - f) Energy Efficiency – Led by BEE (Representation from Cement Mfrs., Fertilizers Mfrs. and Textile Mfrs. may be included)
 - g) Environment – Led by NEERI (Consent of NEERI may be sought)
 - h) Electric Vehicles (EVs), Intelligent Automation & IOT in Power Sector / Cyber Security – led by IITs
 - i) Standards – Led by IEEMA, Cargill etc.
 - j) Artificial Intelligence/Robotics – Led by IITs/NITs
2. Each Group shall comprise of members from CEA / NPTI / CPRI / Utilities / Academics / GE. The Group Leader shall be free to co-opt other team members. After constitution of the Group, the following shall be ensured:
 - a) Objectives of the Group shall be identified.
 - b) Utility oriented problem areas and emerging areas where R&D needs to be done are to be taken up.
 - c) The Group is free to prioritize the issues.
 - d) The infrastructure available with various Power Sector Companies, Industries and IIT/NIT/IISc and lab facilities shall be identified for pooling of resources and avoiding redundancy and additional expenditure.
 - e) The fund requirement for various activities shall also be assessed.
 - f) Recurring additional funds in addition to the one-time allocation may also be required and the same shall be impressed upon as per requirements.

- g) The outcomes of the research so conducted may be more useful to the industry as it will assist in solving problems and/or reducing the costs.
 - h) It shall help in indigenous development of components and equipment as well.
 - i) Manpower requirements may also need to be assessed.
 - j) Initially the Groups may focus on areas where fund requirement may not be very high.
 - k) Groups may further identify sub-groups for smooth transition and dovetailing various aspects from time to time.
 - l) The Groups may suggest a roadmap for R&D in Power Sector.
3. IIT, Gandhinagar and GETRI, Ahmedabad have collaborated to work on Distribution related issues. Such collaborations may also be pursued.
 4. Member-Convener shall be NPTI.
 5. The mechanism for necessary Funding of the R&D activities and budget allocations thereof has to be evolved.
 6. Each Group Leader may decide the members in that Group. Generally, the constituent members may be chosen from Academics, Central and/or State Utilities, Manufacturers, CEA, CPRI, EESL, BEE etc. and/or as per the requirements thereof.
 7. IEEMA may essentially represent in all the Groups for an industry connect and requirements thereof.
 8. It was deliberated in the meeting regarding funding of the R&D Projects that will be taken by various Groups. In the recent meeting of Standing Committee of Governing Council, NPTI held on 28.6.2018 it was also resolved in Item No.4 – R&D activities at NPTI as under:

“The Committee observed that the primary function of NPTI was training whereas CPRI was entrusted primarily with Research & Development functions. It has to be seen by NPTI that its R&D activities do not overlap with those of CPRI.

The matter of taking up R&D activities was deliberated upon and the Committee agreed that NPTI may take up relevant R&D activities wherein it could enhance its core area of training and its strengthening.

The Committee advised that NPTI may also explore the funding/financing of its R&D projects under the recently approved projects of CPRI by SFC.”

9. NPTI has been entrusted with primary responsibility of capacity building in Power Sector. Looking into the Minutes of Standing Committee on Energy Recommendation Sl.No.16, Para No.2.16, DG, NPTI may explore collaboration with the industry (IEEMA) for R&D in identified thrust areas. Thrust areas identification has been set in the first R&D meeting held in NPTI Corporate Office, Faridabad on 25.10.2017 which covers –

Thermal Generation

- Identifying the impact of cycling loading on power plant components due to increased renewable penetration in the grid.
- Utilization of Waste Heat Recovery technologies for enhancing the power plant efficiency.
- Advanced Surface engineering technologies for higher life expectancy of Thermal Power Plant components.
- Design & Development of Last Stage Steam Turbine Blades and balancing of flue gas flow inside boiler for Improved Performance.
- Development of technologies for on-line measurements of coal flow, fineness, heating value, and balancing for combustion optimization in utility boilers, sensor systems for online fuel calorific value and un-burnt carbon in ash measurement.
- New improved methods of prevention of scaling on turbine blades and piping system in thermal power plants.
- Application of latest technologies such as Drone/LiDAR, Robotics, Phasor Matching Units in Power Plants.

Hydro Generation

- New superior erosion resistant materials for hydro turbine blades and runner.
- Integrated operation of Cascade Hydro Power projects.
- Measures to tackle Bad Geology during Excavation of Tunnels and Construction of Dam Foundation and Cut off Wall.
- Analysis measures to increase service life for Silt Flushing Gates, Numerical Flow Simulation, Performance Optimization of Hydro Plant components and for Improving Desilting Chamber Efficiency using Computational Fluid Dynamics (CFD).
- Transient dynamic behaviour and runner blade loading during no-load run/ runway, load rejection and start-up as well as shutdown of the Francis turbine. A strategic start-up and shutdown technique of the Francis turbine may be developed.
- Finding non-intrusive methods of assessing the sub-surface geology.

Transmission

- The research on UHV DC +/- 800 kV transmission system covering the following aspects: (1) DC electric field, corona studies on equipment and electrodes; (2) Effect of pollution on insulator surface; selection of insulator profile, configuration to withstand DC stress under normal and polluted condition, (3) Performance of bushings under DC electric stress, (4) Effects of DC stress on transformer insulation, ageing studies, diagnostic tools.
- Development of controllers for Flexible AC Transmission Systems (FACTS) devices.
- Performance improvement of Bushings and Transformers.
- Superconducting Magnetic Energy Storage System (SMES).
- Mitigation of Power System Harmonics at Transmission and Distribution Levels and Improvement of Power Quality at Distribution Level.
- Transformer - Less HVDC Transmission.
- Higher Temperature Superconducting (HTS) Technology in Power Sector.
- Intelligent Cyber Security related Software Solution and its application to Power Sector.
- Gas Insulated Lines (GIL) for last mile connectivity.

Distribution

- Intelligent Distribution/Transmission Architecture Design & Development.
- Need for development of organic polymer based electroluminescent light sources, which could compete with High power silicon based light emitting devices.
- Development of energy efficient, cost-effective, reliable and future ready LEDs as per requirement of domestic environmental condition.
- Study impact on power quality due to large scale integration of renewables
- Appropriate tariff modes, which will be able to factor in charges based on time-of-day (TOD) and peak energy versus average energy consumption
- Energy Storage Devices; Large capacity Power Storage Technology.

Renewable Energy

- Solar PV performance and degradation studies with advance technology
- Micro grid and integration of renewable energy into the grid – Issues and remedial measures.
- Indigenous development of cost effective floaters for floating solar plants.
- Indigenous development of wet and dry robotic cleaning system for PV modules.
- Development of super hydrophobic coatings for PV modules.
- Utilisation of Unmanned Aerial Vehicles (UAVS) Drone & Li DAR for PV Plant inspection.

- Development of solar thermal and fossil fuel based hybrid power plants.
- Reactive power management at the level of micro grid and distribution system and its contribution towards the stability of the grid.
- Fuel Cell development
- Electric Mobility Issues – development of super-efficient batteries with fast charging capabilities suitable for transport application.
- Bio-Mass and Bio Fuel for energy generation.
- Waste to Energy conversion
- Mechanism for safe disposal and recycling of solar PV panels to counter the related environmental pollution.
- Impact of large scale integration of renewable into the Grid.
- Development of methodology/equipment to detect micro cracks in solar cells.
- Smart utilisation of solar and wind farm inverters as FACTS devices in grid integrated renewable energy.

Power Sector in General

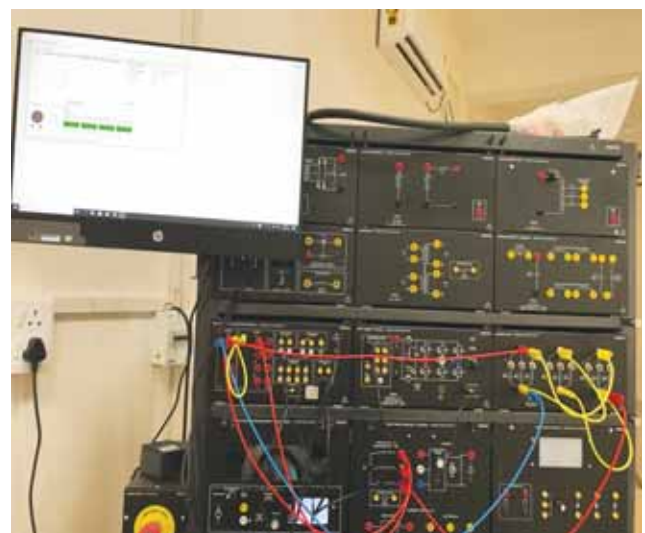
- Internet of Things (IOT), Big Data Analytics, cloud computing, Cyber Security and protection of equipment and system.
- Use of Robotics and Unmanned aerial vehicles (UAV e.g. DRONE) in construction, supervision, operation and maintenance of power system equipment in difficult and inaccessible areas.
- Development and use of GIS Software in power system assets/ geographic data representation.

Environment, Energy Efficiency

- Technology development of Flue Gas Desulphurization (FGD) system for high sulphur coal through electron beam (SO_2 to SO_3 conversion).
- CO_2 storage and capture in geological formations like Basalt and Sedimentary rocks, Amine solution etc.
- Outdoor insulation – Pollution effect in AC & DC systems.
- Development of waste water treatment and recycling technologies.
- Exploring possibility and knowledge sharing in carbon Capture and utilisation techniques.

In the above different areas NPTI will collaborate not only with the industries (IEEMA) for R&D in identified Thrust Areas as mentioned above but also would like to closely collaborate with Utilities and Power Sector Organisations for transfer of technology in process as and when R&D is matured.

Ministry of Power has to find out the mode of funding of Projects such that Projects envisioned may come to the ground reality.



Smart Grid Lab at NPTI Alappuzha



11. NPPT PUBLICATIONS

To dissipate the knowledge among the technical domain, NPPT publishes huge number of books, manuals, notes etc. These resource materials are prepared by domain experts and are meant to give in depth exposure and knowledge to the readers in related fields.

S.No.	Title	Price (₹)	Price (US\$)
A) THERMAL POWER PLANT			
1	Thermal Power Plant Familiarisation (Vol.I)	400	20
2	Thermal Power Plant Familiarisation (Vol.II)	600	30
3	Thermal Power Plant Familiarisation (Vol.III)	425	21
4	Thermal Power Plant Familiarisation (Vol.IV)	400	20
5	Thermal Power Plant Operation	600	30
6	Thermal Power Plant Metallurgy	175	09
7	Ash Handling	250	13
8	Fuel Handling System Operation (Hindi)	250	13
9	Schematic Diagram (210 MW Thermal)	350	18
10	Fuel Handling System Operation	250	13
11	Environmental Management in Power Sector	600	30
12	Thermal Power Plant Performance and Efficiency Monitoring	425	21
13	Thermal Power Plant Chemistry	350	18
14	500 MW Fossil Fuel Power Plant Simulator Operating Procedures	550	28
15	Atmospheric F B C Boilers	250	13
16	Boiler Feed Pump Design, Construction & Operation	250	13
17	Circulating F B C Technology	250	13
18	Power Station Safety	350	18
19	Safety in Power Station (Hindi)	200	10
20	210 MW Thermal Schematic Diagrams (Combustion Engineering Boiler & KWU Turbine)	200	10
21	HP - LP Bypass System	350	18
22	Pulverisers and Feeders	200	10
23	Pulverised Fuel Fired Boilers	350	18
24	KWU Steam Turbine Governing and Protection System	425	21
25	210 MW Turbo Generator Operation and Stability	200	10
26	Lubrication Systems for Power Station	300	15
27	210 MW Simulator Training	550	28
28	Steam Turbines for Power Generation	650	33
29	Vibration	200	10
B) HYDRO POWER PLANT			
30	Hydro Power Plant Familiarisation	400	20
31	Hydro Power 2000: An Indian Perspective	1000	50
32	Silting Problems in Hydro Power Plants & Their Possible Solutions	495	25
33	Up rating and Refurbishment of Hydro Power Plants	495	25
34	Hydro Environment Interface	950	48
35	Small Hydro	595	30
C) COMBINED CYCLE GAS TURBINE POWER PLANT			
36	Gas Turbine and Combined Cycle Power Plant	400	20
D) CONTROLS AND INSTRUMENTATION			
37	Control & Instrumentation (Vol. I)	600	30
38	Control & Instrumentation (Vol. II)	425	21
39	Control & Instrumentation (Vol. III)	350	18
40	Data Acquisition System & Distributed Digital Control	250	13
41	Condition Monitoring of Power Transformers	250	13
42	Programable Logic Controller & Fuzzy Logic Controller and their Applications in Instrumentation	250	13
43	Control Valves Selection and Sizing	300	15
44	Programable Logic Controls	350	18
E) REGULATORY ISSUES			
45	Journal on ERC Orders-2nd Edition	595	30
F) MAINTENANCE MANUALS			
46	Motor Maintenance	200	10
47	Battery Maintenance	250	13
48	Battery Maintenance (Hindi)	250	13
49	Valve Maintenance	350	18
50	Pump Maintenance	400	20
51	Pump Anurakshan (Hindi)	350	18
52	Relay Maintenance	200	10
53	Maintenance Planning & Cost Control	250	13
54	Maintenance of Power Transformers	350	18

G) POWER PLANT AUXILIARIES			
55	Fans & Heaters	425	21
56	Fan & Heater (Hindi)	425	21
57	Compressor & Compressed Air	200	10
58	Valves	400	20
59	Power Station Pumps	350	18
H) POWER SYSTEMS MANUALS			
60	Electrical Protection System	350	18
61	Power System Studies and Load Despatch	350	18
62	Modernisation of Power Distribution (Focus on APDRP)	595	30
63	Power Transmission & Distribution	495	25
64	Load Management in Power Sector	400	20
65	Static Excitation System	250	13
66	Energising Your Power Utility	395	20
67	Basics of Electric Power System	200	10
I) SUB STATION MANUALS			
68	O&M of EHV Sub-Stations Vol. I	250	13
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