Azadi Ka Amrit Mahotsav

CENTRAL POWER RESEARCH INSTITUTE

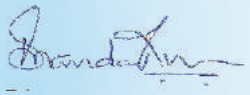
Annual Report 2020 -21

FOREWORD

CPRI, the premier Research Institute in our country, is actively involved in the focused area of power sector undertaking and coordinating the Research & Development projects approved / funded under the Research Scheme of Ministry of Power.

CPRI being one of the largest test laboratories in the world having State-of-the-Art facilities is serving as a National Testing and Certification authority for power equipment helping the electrical industry to manufacture quality products and the utilities to ensure reliable power supply.

CPRI is continuously engaged in augmenting its existing facility and establishing new facilities, so that tests are carried out as per relevant National and International standards.



(V.S. Nandakumar)
Director General

CONTENTS

Governing Council
Central Power Research Institute
(Present Composition)

Shri Alok Kumar, IAS
Secretary, Ministry of Power
President, Governing Council

Shri B K Arya
Chairperson (I/c.), CEA
Vice -President, Governing Council

Shri Ashish Upadhyaya, IAS
Additional Secretary &
Financial Adviser,
Ministry of Power
Member, Governing Council

Shri S.K.G Rahate, IAS
Additional Secretary,
Ministry of Power
Member, Governing Council

Shri Jithesh John
Economic Adviser, Ministry of Power
Member, Governing Council

Members of CPRI Governing Council

1	The Secretary to the Govt. of India, Ministry of Power	President
2	The Chairperson, Central Electricity Authority	Vice-President
3	Additional Secretary & Financial Adviser, Ministry of Power	Member
4	The Additional Secretary, Ministry of Power	Member
5	The Economic Adviser, Ministry of Power	Member
6	Member (Power System), Central Electricity Authority	Member
7	Member (Planning), Central Electricity Authority	Member
8	The Secretary, DSIR - Ministry of Science & Technology	Member
9	The Secretary, DIPP - Ministry of Commerce & Industry	Member
10	The Secretary, Ministry of New & Renewable Energy	Member
11	The Chairman & Managing Director, Bharat Heavy Electricals Ltd.	Member
12	The Chairman & Managing Director, NTPC Ltd.	Member
13	The Chairman & Managing Director, Power Grid Corporation of India Ltd	Member
14	The President - IEEMA	Member
15	The Secretary, Central Board of Irrigation & Power	Member
16	The Managing Director, Bangalore Electricity Supply Company (BESCOM)	Member
17	The Managing Director, Dakshin Haryana Bijli Vitran Nigam (DHBVN)	Member
18	The Director, IIT Delhi	Member
19	The Director, IIT Madras, Chennai	Member
20	The Director, IIT Guwahati	Member
21	The Director General, Bureau of Energy Efficiency	Member
22	The Director General, Central Power Research Institute	Member – Secretary

Section 1

Organisational Set - up

Organisational Set - up

CPRI - an overview

The Central Power Research Institute (CPRI) was established by the Government of India in 1960, both in Bengaluru & Bhopal, with its Headquarters in Bengaluru. The Institute was re-organised into an autonomous society in the year 1978 under the aegis of the Dept. of Power, Ministry of Energy, Government of India. The main objectives of setting up the Institute were for it to function as a National Power Research Organization for undertaking applied research in electrical power engineering, to innovate and develop new products, besides functioning as an independent national testing and certification authority for electrical equipment and components to ensure reliability in the power system.

Objectives of CPRI

Technical

- Function as a National Power Research Organization for undertaking and / or sponsoring research and development projects in the fields of generation, transmission, distribution and operation of electricity supply systems.
- Provide necessary centralized research and testing facilities for evaluation of electrical materials and performance of power equipment.
- Serve as a National Testing and Certification Authority for the purpose of certification of rating and performance to ensure availability of equipment of adequate quality for use under conditions prevalent in Indian Power Systems.
- Act as an apex body for initiating and co-ordinating the R&D in the field of electric power.
- Evolve criteria for standards of various equipment for operation under Indian conditions and effectively participate in formulation of national standard specifications.
- Identify problems in the areas of basic and oriented basic research and arrange such studies in national academic Institutions.
- Co-ordinate R&D activities in the various State Electricity Boards and maintain liaison with other Institutions engaged in research connected with power systems and / or power equipment.
- Collect information and maintain documentation in the field of power engineering and prepare, print and publish technical paper, periodical or report in furtherance of the objects of the Society.
- Establish, maintain and manage laboratories, workshops and other facilities for furthering scientific and technological research and conduct experiments for exploiting the invention or discoveries to the cause of power development in the country.
- Enter into agreement with any enterprise or institutions or person or persons and provide funds to them to carry out research and development programme of the Society.

Financial

- Accept grants of money and other assistance from the Govt. of India and other sources, Indian or foreign or enter into any agreement with them with a view to promote the objectives of the Society provided that in respect of foreign resources prior approval of the Government of India is obtained.
- Acquire by gift or purchase or exchange or lease or hire or otherwise, howsoever, any lands, buildings situated in India, equipment and any other properties movable and or immovable for the furtherance of the objectives of the Society and construct or alter any building which may be necessary for the Society.
- Sell or lease or transfer or exchange or mortgage or dispose of or otherwise deal with any properties whatever belongings of the Society, provided that prior approval in writing of the Central Government is obtained.
- Draw, make, accept, endorse and discount cheques, notes or other negotiable instruments.
- Invest the funds or money of the Society not immediately required in any securities or in such manner as from time to time to be determined by the Governing Council.

Administrative

- Establish and award research studentships, fellowships.
- Retain or employ professional or technical advisors, consultants or workers to further the object of the Society and to pay there of such honorarium, fees or remuneration as may be thought expedient.
- Negotiate and enter into contracts on behalf of the Society and vary or rescind such contracts.
- Create administrative, technical, ministerial and other posts under the Society and to make appointments thereto in accordance with the rules and regulations of the Society.
- Take appropriate measures for training and welfare of the employees.
- Make rules and regulations and bye-laws for the conduct of the affairs of the Society and to add, to amend, to vary or rescind them from time to time with the approval of the Government of India.
- Do all such other lawful acts, deeds or things as are incidental or conducive to the attainment of any of the above objectives.
- Maintain a research and reference Library.

Management

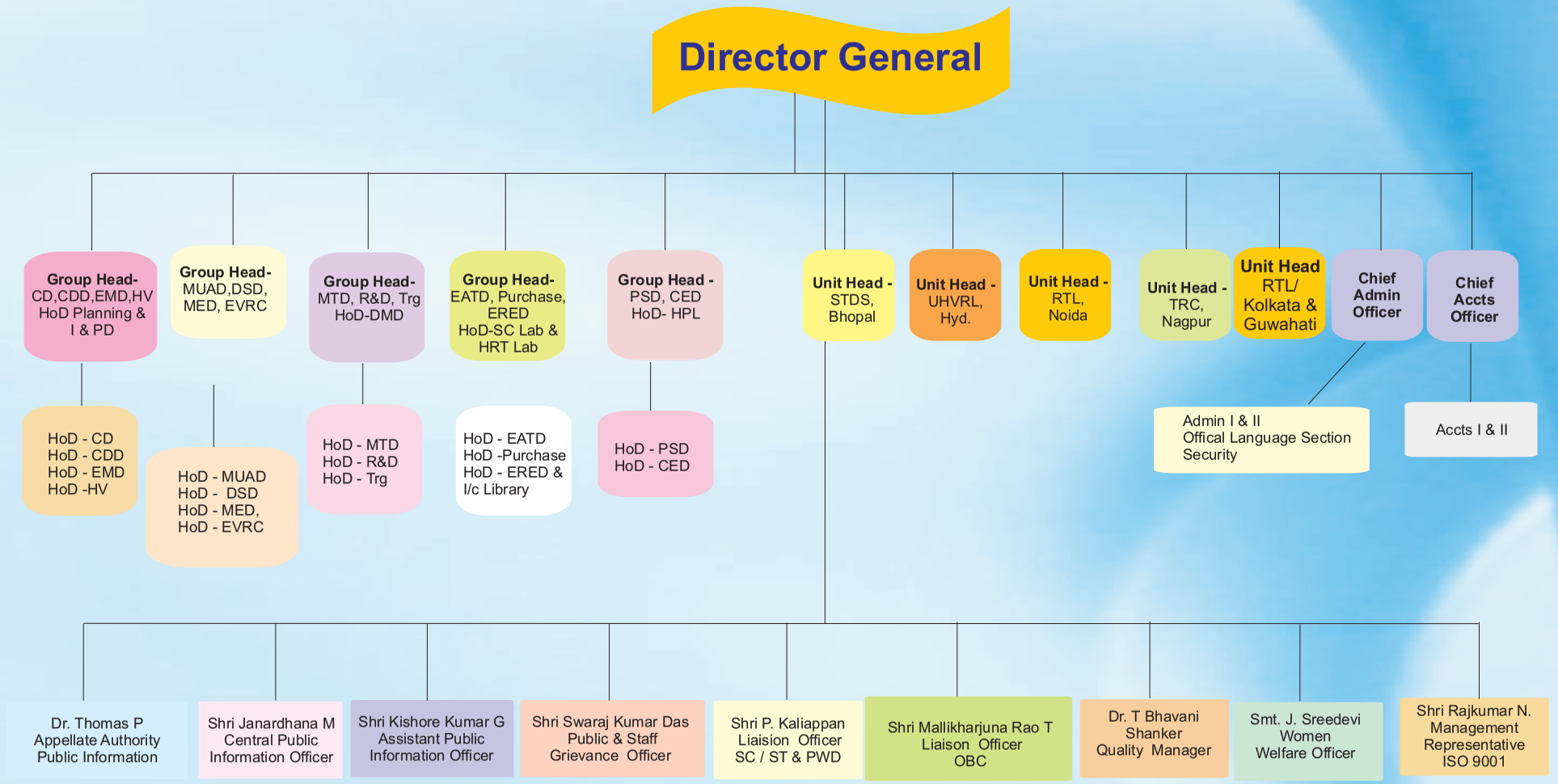
The management of the institute vests in its Governing Council comprising members representing different Utilities, Ministries of the Government of India, Central Electricity Authority, State Electricity Boards, Power Supply Utilities, Indian Electrical & Electronics Manufacturers' Association, and various other academic and R&D Organisation of

National importance in the field of electric power engineering. The Secretary, Ministry of Power and Chairman, Central Electricity Authority act as the President and Vice-President of the Governing Council respectively, while the Director General of the institute acts as the Member Secretary of the Governing Council.

A Standing Committee under the Chairmanship of Special Secretary / Additional Secretary, MoP with Member (Power Systems), Central Electricity Authority, Joint Secretary & Financial Adviser from the Ministry of Power and Joint Secretary looking after CPRI in MoP as Members and the Director General-CPRI as Member-Convener takes decisions on behalf of the Governing Council from time to time on administrative and financial matters. **The Composition of this committee is described in Appendix - 1.**

The Composition of Committee on Testing & Certification is given in the Appendix - 2. The Committee takes decision on the test tariff related activities. The committee is chaired by Member (Power Systems),CEA.

ORGANISATIONAL CHART OF CPRI
As on 31 st March - 2021



CENTRAL POWER RESEARCH INSTITUTE, BENGALURU & ITS UNITS

Central Research & Testing Laboratory
Prof. Sir. C. V. Raman Road,
P. B. No. 8066, Bengaluru - 560 080

Ultra High Voltage Research Laboratory
P.B. No. 9, Uppal P.O.
Warangal Highway,
Hyderabad - 500 098

Thermal Research Centre
CPRI Colony, Vidyut Vihar,
Koradi,
Nagpur - 441 111

Switchgear Testing & Development Station
Govindpura, Near BHEL,
Bhopal - 462 023

Regional Testing Laboratory
No. 3A, Sector - 62,
Institutional Area,
Noida - 201 309

Regional Testing Laboratory
1st Floor, CTD Workshop, WBSEDCL,
Abhikshan Building, B N Block,
Sector - V, Salt Lake City,
Kolkata - 700 091

Central Research & Testing Laboratory (CRTL), Bengaluru

Centre for Collaborative & Advanced Research (CCAR)

Established in 2006, this Centre facilitates and promotes advanced research, thereby helping the power sector to derive the benefits of latest technology.

The main objectives of the Centre are to:

- Provide infrastructure for professionals to conduct research in power sector development.
- Create a conducive environment for collaborative research between R&D Institutions, Industry, and Academia
- Execute projects based on multi-disciplinary expertise drawn from different Institutions
- Disseminate expertise through continuing education training programme initiatives
- Foster healthy interaction and exchange of ideas between research organizations at a global level

Cables & Diagnostics Division

This division has facilities for carrying out R&D and also for evaluation of all types of cables, cable accessories, motor and transformer insulation and partial discharge measurement of HV equipment conforming to relevant National and International standards. Expertise is also available for Diagnostic, RLA and LE (Remaining Life Assessment & Life Extension) studies on electrical equipment and for detailed investigations of specific problems related to Research and Development in these areas. The division has two laboratories.

1. Power Cables Laboratory
2. Diagnostics Laboratory

Power Cables Laboratory offers consultancy on:

- Failure analysis of Power Cables and accessories like Joints/Terminations
- Partial discharge measurements

Diagnostics Laboratory has been rendering consultancy and field engineering services in the area of diagnostic testing of High Voltage substation and power plant electrical equipment. The Laboratory undertakes condition assessment of insulation system of the substation/ power plant electrical equipment.

Power Capacitors Laboratory

Power Capacitors Laboratory of CPRI, Bengaluru has established state-of-the-art facilities to cater to the test requirements of Capacitor Manufacturers within the country and abroad. Research, Testing and Evaluation of Power Capacitors which have applications as shunt capacitors, series capacitors, surge protection capacitors, motor capacitors, fan capacitors, fluorescent capacitors are carried out as per National and International Standards. Also developmental tests as per Customers' requirements are conducted. Laboratory also has facilities for undertaking tests on filter reactors and series damping reactors associated with LV capacitors. The laboratory with the unique facilities is the first of its kind in this part of the world.

Testing of LV APFC Panels

Tests on LV APFC panels are carried out as per IEC 61921 and IEC 61439. The temperature rise test is carried out on APFC panels with all capacitor units, detuned/damping reactors, if any, and other components connected. Temperature rise test can also be carried out at elevated ambient temperature of 55° C.

Environmental tests

Environmental tests are carried out on various electrical and non-electrical equipment / components / materials as per relevant standards.

Research and Consultancy

The Division undertakes R&D in the following areas:

1. Development of Indian Standard Specification for LV APFC Panels-Bureau of Indian Standards (BIS), New Delhi, Sponsored R&D project.
2. Switching transients associated with capacitors.
3. Investigation of PD Activity in Model Transformers.
4. Selection of appropriate type of Low Voltage capacitors for Low Voltage distribution system.
5. Review of Specification for High Voltage and Low Voltage capacitor banks
6. Root cause analysis of premature failure of capacitors
7. This Laboratory offers Consultancy and field engineering services for On-Line partial discharge measurement on power transformers in services.

Dielectric Materials Division (DMD)

This Division has comprehensive evaluation facilities for insulating materials and systems. The insulating materials are evaluated and tested for electrical,

mechanical, physical & electro- chemical and thermal properties.

This division has the following laboratories:

- Liquid Dielectrics Laboratory
- Polymer Laboratory
- Lubricating Oil Laboratory

The Division has developed several polymeric materials, namely epoxy novolok resin for insulators & electrical grade laminates and FRLS cables for critical safety applications. The Liquid Dielectric Laboratory has developed new techniques for dissolved gas analysis. Expertise in Furan analysis interprets the condition of solid insulation in transformers. It has also developed dielectric fluids based on Rapeseed oil.

The Polymer Laboratory has well-experienced technical personnel to advise the polymer industries on setting up plants, process improvement, etc. and involved in R&D of polymeric insulators for electrical equipment. This division undertakes consultancy work and sponsored projects for different power utilities and manufacturing companies.

The Lubricating Oil Laboratory has been set up to meet the quality assessment needs of industrial lubricating oils, turbine oils, etc.

Evaluation facilities like Cone Penetration, Drop Point, Oil Separation, Flash Point and Density are also available for Greases, Petroleum Jelly, Cable Filling & Flooding Compounds. Degree of Polymerization (DP) evaluation facility for solid insulation in power transformers is also available.

Distribution Systems Division (DSD)

With state-of-the-art facilities and software tools, the Distribution Systems Division (DSD) of CPRI has been rendering research and consultancy services in finding solutions to various problems faced by the electrical industry in the area of power distribution.

The division has been rendering consultancy services to the Electricity Regulatory Commission in estimation of losses in distribution and finalization of tariff Structure. CPRI has been involved in Flagship programmes namely, Accelerated Power Development & Reforms Programme (APDRP) erstwhile Rajiv Gandhi Grameen Vidyut Vikas Yojana (RGGVVY) & the present Deendayal Upadhyay Grameen Vidyut Yojana (DDUGVY) of Government of India and Integrated Power Development Scheme (IPDS) over the past several years. Research Consultancy assignments as well as the SCADA and distribution reforms related works are taken up by this Division.

Electrical Appliances Technology Division (EATD)

Important activities of this Division include performance evaluation and certification of low-voltage equipment like switches, bulbs, fans, heaters, refrigerators, air-conditioners, batteries etc.

Balanced Ambient Calorimeter

The Laboratories operating under this division are:

- Domestic Electrical Appliances Laboratory
- Ingress Protection Laboratory
- Battery Testing Laboratory
- Illumination Laboratory
- Fan Testing Laboratory
- Refrigerator and Air Conditioner Testing Laboratory

Important activities of the division relate to check testing under the standards and labeling programme of the Bureau of Energy Efficiency.

Earthquake Engineering & Vibration Research Centre (EVRC)

This Division is equipped with facilities for providing testing, research and consultancy services in the area of seismic and vibration qualification of instruments/ equipment for nuclear power plants, other generating stations, and Railways as per National and International standards. In addition, this Centre offers consultancy services in checking the design adequacy of Structures/Substations for earthquakes.

The Division is equipped with a Triaxial shake table of 3m x 3m size and 10 ton pay load capacity for simulating earthquake vibrations. In addition, has Electrodynamic

Shaker Systems for carrying out vibration tests on products and assemblies.

Energy Efficiency & Renewable Energy Division (ERED)

This division undertakes energy audit, energy conservation and field engineering services of power plants. This division also provides interdisciplinary field study packages to thermal power stations and process industries on remaining life estimation, renovation modernization, and up-gradation and life extension of components, sub-systems and plants. The division is accredited by Bureau of Energy Efficiency (BEE) and Petroleum Conservation Research Association (PCRA) for conducting energy audit in power plants and other units.

The laboratory has facilities for evaluating and certifying the following:

- Solar Photovoltaic Lanterns & Pumps
- Compact Fluorescent Lamps and LEDs
- Solar Home Lighting and Street Controllers
- LED Lighting Systems
- Solar Photovoltaic Panels
- Grid Tied Inverters
- Motors

High Voltage Division (HVD)

This division has facilities for evaluating the performance & certifying high voltage electrical equipment and investigating the problems in the area of HV & EHV transmission of electric power.

The laboratory conducts performance evaluation of equipment like Power Transformers, Potential Transformers, Air Break switches, Isolators, Cables, Bushings, Power Line Accessories, Lighting Arresters etc., up to 400 kV systems.

The following Laboratories operate under this Division:

- High Voltage Laboratory
- Pollution Laboratory
- Impulse Current Laboratory

High Power Laboratory (HPL)

This laboratory is unique in this part of Asia and helps in evaluation of EHV equipment.

This Laboratory is equipped with facilities for development, evaluation and certification of EHV Circuit Breakers, Power Transformers, Current Transformers, Isolators, Line (Wave) Traps, Reactors, Insulator Strings, etc. It caters, mainly to performance evaluation of the above equipments under short circuit and other switching conditions.

The facilities available in this Laboratory are as follows:

- Direct testing facility for power equipment up to 2500 MVA, 72.5 kV, 3-Phase and 1400 MVA, 245 kV, Single Phase
- Synthetic testing facility for extra High Voltage Circuit Breakers rated up to 400 kV, 63 kA

Metering & Utility Automation Division (MUAD)

This Laboratory undertakes Type Testing of Electro-Mechanical and Electronic meters (Static Meters, Pre-payment meters & Smart Meters) of voltage rating of 3 phase, 415V single phase 240V, with current rating of 200 Amps with an accuracy range from 0.2s to 2.0s (Active and Reactive modes) as per national and international standards and also carries out performance evaluation based on Acceptance Test, Routine Test as per utility requirements. The Division has recently established facilities for evaluating smart meters.

The following Laboratories operate under this Division:

- Calibration Laboratory
- Energy Meter Testing Laboratory

The Division has an unique state-of-the-art communication protocol laboratory with facility to test energy meters and substation communication equipment as per the IEC / MODBUS/ DNP protocol standards.

This division is the backbone of all Information Technology activities at CPRI, and is built with state-of- the-art dedicated servers that run on different platforms like Sun Solaris, SCO Unix, Linux and Windows. The Division also maintains NAS storage devices and takes care of the Internet services at CPRI.

Insulation Division

The Insulation Division has specialized facilities and expertise for testing and evaluation of Dielectric materials and to carry out accelerated ageing and corrosion resistance studies on Dielectric materials.

Laboratories under this Division are:

- Solid Dielectrics Laboratory
- Heat Run Test Laboratory

Solid Dielectrics Laboratory has comprehensive, testing and evaluation facilities for solid insulating materials and systems. Insulating materials are evaluated and tested for electrical, mechanical, physical and electro-chemical properties. This laboratory has undertaken consultancy works and sponsored projects for many power utilities and industries. Assistance has been rendered to BIS, in formulation of various standards on enamelled winding wires and insulating materials & systems.

Cyclic Corrosion Test Equipment

Weathering using Xenon Arc Lamp

Heat Run Test Laboratory has facility to carry out Temperature rise test on Distribution, Transmission & Power equipment and accessories as per relevant National & International Specifications.

Temperature Rise Test up to 6700 Amps, Milli volt drop & resistance tests from 1.0 micro ohms to 20 kilo ohms are conducted on LT Panels, Isolated Phase Bus Ducts and Isolators as per IS, IEC, ANSI and ASTA standards.

LT Panel

Isolated Phase Bus Duct

Isolator

Materials Technology Division (MTD)

This Division has the following Laboratories for evaluation and development of organic and inorganic materials;

- Materials Characterization and Engineering Laboratory
- Corrosion Laboratory
- Analytical Laboratory
- Fuel Analysis and Combustion Research Laboratory
- Power Station Technology and Field Engineering

This Division offers consultancy services to Power Plants in the areas of:

- Wear & Erosion and Mechanical Evaluation Facilities
- Remaining Life Assessment and Renovation & Modernization
- Industrial Solid Waste Utilization Centre

Mechanical Engineering Division (MED)

This Division is engaged in the study of the mechanical engineering problems faced by the transmission systems of electrical utilities. Apart from offering solutions to such problems, the Division offers Consultancy services for evolving optimized tower designs. In addition, this Division has laboratories to undertake R&D and to provide evaluation facilities for transmission towers, line components and accessories, vibration dampers, spacer / spacer dampers etc.

The Laboratories operating under this Division are:

- Prototype Tower Testing Station
- Structural Materials Testing Laboratory
- Vibration Laboratory
- Wake Simulation Laboratory

Power Systems Division (PSD)

This Division is involved in the study of various problems encountered by manufacturers and utilities in the design, installation and operation of electric power systems, using both mathematical and physical models.

The division has the following facilities:

- Power System Digital Simulation Centre
- Real Time Digital Simulator (RTDS)
- Relay Testing Laboratory

The Division also offers consultancy on automation related to Substations, Distribution, SCADA, SMART GRID etc., to all major utilities in the country. It also offers consultancy services in the area of Generation & Transmission system studies, Protection System studies, Performance evaluation of controllers etc.

- With PMUCAL Phasor Measurement Unit Testing & Calibration System 6135A, this Division undertakes Calibration and Testing of PMU (Phasor Measurement Unit) as per standards and IEEE Synchro phasor Measurement Test Suite specification -2015 (version 2) with the pre-loaded suite of required tests and also performs custom testing by simulating static and dynamic conditions that a PMU can experience in a power grid to verify operation in ways not specifically required by the standard.

PMU CALIBRATOR

Short Circuit Laboratory (SCL)

This Laboratory has facilities to undertake evaluation, certification, and development of LT Switchgear, Fuse gear, and Power System Apparatus. Applied Research is also undertaken to lend a helping hand in the development of indigenous products.

Type tests and Routine tests on low voltage switchgears and controlgears, distribution transformers up to 1 MVA 11kV class and other power system apparatus are carried out in the Short Circuit Laboratory as per the relevant Indian Standards (IS) and International Specifications (IEC, BS, CSA, UL, ANSI, IEEE). The laboratory is accredited by Intertek-ASTA Certification Services that enables ASTA Certificates to be issued to the customers.

Training Division

The Training Division identifies the training needs of CPRI. The staff members are regularly deputed for project-specific training programs, organized in-house as well as through outside agencies.

The Training Division also organises customized training modules for engineers from Power utilities and Electrical Industry.

UNITS OF CPRI

Switchgear Testing & Development Station (STDS), Bhopal

The unit situated adjacent to the BHEL premises at Bhopal, has two main testing stations for conducting Short Circuit tests. They are:

STATION I:

Direct Short Circuit Testing Station of 1250 MVA capacity at 12kV capacity utilizing two specially designed 1500 MVA short circuit alternators, mainly caters to short circuit tests on high and Medium Voltage Switchgears, Transformers and other allied equipment.

STATION II:

The On-line Testing Station is drawing power up to 100 MVA from the MPSEB Grid from the Chambal Substation through 132 kV line. The fault level of 132 kV Bus at Chambal Substation is 1900 MVA at 0.2 Power factor. This station mainly caters to Short Circuit tests on Low Voltage Switchgears, Transformers and other allied equipment.
The Laboratory provides facilities for performance evaluation and certification of EHV circuit breakers, power transformers, isolators, line (wave) traps, reactors, insulator strings etc., under short circuit and other abnormal conditions. A 100 MVA on-line Evaluation Station is a special facility that enables evaluation and certification of LT and HV switchgears in addition to the 1500 MVA short circuit alternators.

Supplementary Test Laboratories:

Prior to and subsequent to the short circuit tests, a variety of tests are to be conducted as stipulated by the standards. These tests are conducted at the following Laboratories:

- Temperature Rise Test Laboratory.
- ELCB, MCB, MCCB, RCCB, Contactors and Fuse Test Laboratory.
- Ingress Protection Test Laboratory.
- High Voltage Laboratory (for dry/wet power frequency and lightning impulse).
- CT and PT Test Laboratory.
- Partial Discharge Laboratory.

- **Mechanical and Electrical Endurance Test Laboratory:**

  These facilities are in the process of continuous up-gradation to meet newer test requirements. These laboratories also conduct type tests, besides pre & post short circuit supplementary tests.

Other Facilities:

- EMI/EMC and Energy Meter Testing Laboratory
- Calibration Laboratory
- Transformer Oil Testing Laboratory
- EHV Laboratory

Regional Testing Laboratory (RTL), NOIDA

Regional Testing Laboratory, which was originally situated at Muradnagar, was shifted to Noida in order to provide better services to customers, in the year 2009.

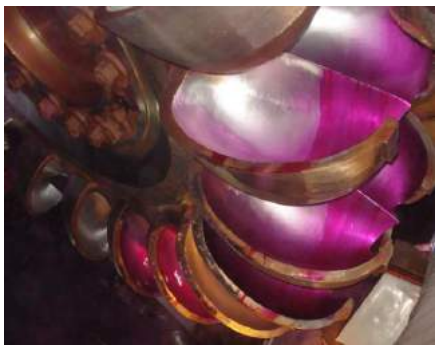
The Laboratory was set up with a view to cater to the testing, certification and evaluation needs of electrical power equipment manufacturing industry. This unit acts as a liaison unit of CPRI with various customers in Northern Region and coordinate their test requirements which are beyond the scope of the Regional Laboratory but within the capabilities of CPRI at Bengaluru and other units. Various Laboratories housed under this unit are:

- High Voltage Laboratory
- Liquid Dielectric laboratory
- Cables Laboratory
- Diagnostics Laboratory
- Energy Meter Testing Laboratory

The important facilities under this Unit are Cables Evaluation Laboratory up to 33 kV rating, a High Voltage Laboratory for evaluation of insulators and transformers and a Transformer Oil Evaluation Laboratory. The Unit also hosts facilities for evaluation of energy meters and diagnostic evaluation of power equipment.

The Unit has established a Mobile Laboratory for calibration of energy meters at site and for helping Central Electricity Regulatory Commission, Delhi Electricity Regulatory Commission etc.

Thermal Research Centre (TRC), Nagpur



This Centre situated near Koradi Thermal Power Station, Koradi, is mainly intended for taking up consultancy and R&D work pertaining to

Thermal Power Stations. The Centre is also equipped to take up consultancy work in the area of environmental impact assessment and investigations on fuel treatment, ignition studies, coal characterization, pilot scale studies for coal gasification, slurry fuels, life estimation of Thermal Power Plant components, renovation & modernization of thermal power plants, etc. This Centre undertakes remaining life assessment and renovation & modernization of Thermal Power Stations and has provided consultancy services to more than fifty Thermal Power Stations. TRC is being relocated with many other facilities to Dhuti village, Nagpur.

Ultra High Voltage Research Laboratory (UHVRL), Hyderabad

UHV Research Laboratory, Hyderabad was commissioned in 1993, with the following objectives:

- To provide design data valid for the country's particular climatic, environmental and operating conditions, for transmission system above 400 kV
- To provide necessary facilities for the development and testing of UHV Equipment

The above mentioned objectives are realized by the following facilities:

Pollution Test Chamber

The Pollution Test Chamber is one of the largest in the world with a diameter of 24 m and a height of 27 m. Salt fog test can be conducted on insulators, bushings etc., up to 800 kV class.

Cascade Transformer

The Cascade Transformer, comprising two units rated 800 kV each (total rating is 1600 kV, 9600 kVA) is used for energizing the experimental line, pollution chamber and testing equipment. The equipment has an extension unit which can generate oscillating switching surge impulse of up to 2000 kV peak.

Impulse Generator

The Impulse Generator is used for switching impulse and lightning impulse tests on air gaps and equipment insulation. The impulse generator rating is 5 MV, and 500 kJ with 25 stages and a height of 23 m.

This Laboratory has the necessary infrastructure to simulate operating voltage conditions in the range of 220 kV to 1200 kV on an experimental line. It is used to evaluate the suitability and adaptability of UHV systems to Indian power systems taking into account the climatic, environmental, ecological and biological conditions prevailing in our country. The facility can evaluate corona loss, audible noise, radio and television interference, electric field etc., under various voltage and climatic conditions. Besides, the Laboratory has the capacity to cater to investigation and

evaluation of equipment rated up to 1200 kV class. This is a 'one of its kind ' facility in this part of the world.

± 1200 kV HVDC Test System

Outdoor ± 1200 kV / 200 mA DC test system has been commissioned at UHV Research Laboratory, Hyderabad. This is a unique facility which was not available in India. The facility will help in conducting research on HVDC transmission as well as facilitating indigenous development & testing of equipment for the new HVDC transmission lines that are coming up in the country.

A View of ± 1200 kV DC Test System

UHV Indoor Shielded Laboratory

UHV Research Laboratory has established a new UHV Indoor Shielded Laboratory. The Laboratory is of dimensions 50 m (L) X 35 m (W) X 35 m (H) and is completely shielded from external interferences. The Laboratory has a 1200kV, 2A, AC Test System with partial discharge test facility for Instrument Transformers, Bushings and other high voltage equipment upto 800kV rating. In addition, the Laboratory is fully equipped with facilities for Capacitance and Dielectric Dissipation Factor Measurement, Radio Interference Voltage Measurement, Corona Test, Accuracy Tests, Temperature Rise Tests on Instrument Transformers, Dry and Wet Power-Frequency Voltage Withstand tests on high voltage equipment upto 800kV rating as per National and International standards.

Aerial view of UHV Shielded Laboratory

800kV RIP Transformer Bushing undergoing Partial Discharge test

Regional Testing Laboratory (RTL), Kolkata

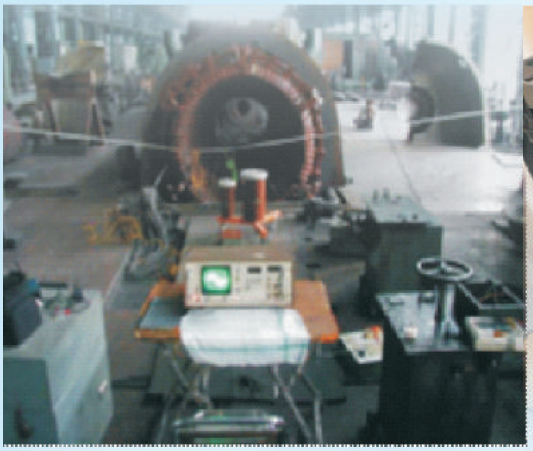
This Laboratory was set up with a view to cater to the evaluation & certification needs of the electrical power equipment manufacturing companies, utilities and consumers in the eastern region. The laboratory is equipped with facilities to carry out evaluation of insulating oils in power transformers as per IS 1866-2000. The dissolved gas analysis of transformer oil in the power transformers, an important diagnostic tool, is available at RTL, Kolkata for assessing the internal condition of the transformers.

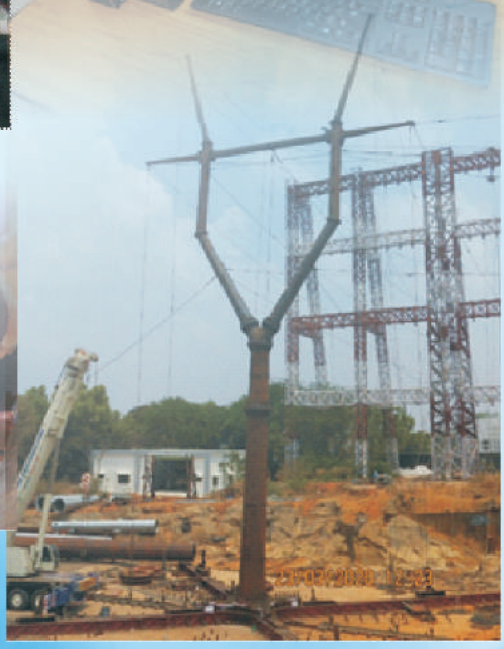
The laboratory has evaluation facilities like High Performance Liquid Chromatography (HPLC) which is an important diagnostic tool for assessing solid insulation in power transformers to evaluate Furfural content (Furan Content). The facility is also being used for assessing the inhibitor level in the transformer oil. This unit co-ordinates the activities of transformer oil testing laboratory located at Guwahati, providing services to the North Eastern parts of India.

A view of Regional Testing Laboratory (RTL), Kolkata

Section- 2

Research & Development





RESEARCH & DEVELOPMENT

CPRI is the Coordinating Nodal Agency for Research Proposals received under the Research and Development schemes in India under Ministry of Power (MoP). CPRI has been entrusted with the responsibility of coordinating the various Research Schemes sponsored by the Ministry of Power, as given below:

A. Projects under R&D Schemes of MoP being implemented through CPRI
   i. In-House Research & Development Projects (IHRD)
   ii. Research Scheme on Power (RSoP) Projects
   iii. R&D Under National Perspective Plan (NPP)
      a. Projects coordinated by CPRI
      b. Projects under Uchhatar Avishkar Yojana (UAY)
      c. Projects under Impacting Research Innovation and Technology (IMPRINT-I)

B. Sponsored Projects by other Ministry/ Department/ Institutions/Organizations etc.

Procedure for screening, review and approval of Project Proposals: CPRI has a comprehensive review and approval mechanism of the proposals received under the R&D Schemes. The proposals are first checked by the R&D Management Division for consistency of information and examined whether the research intent is in line with the Thrust Areas identified in the National Electricity Plan. The proposals are then sent to two domain experts for review of the research content and to evaluate the technical feasibility. Based on the comments, the proposals are put up to a Technical Committee (TC) for recommendation. At present there are four TCs viz. TC on “Hydro”, TC on “Thermal”, TC on “Transmission” and TC on “Grid Distribution & Energy Conservation” Research. The TCs are chaired by eminent Professors from IITs. The proposals recommended by the TC are put up for consideration of DG, CPRI/the Standing Committee on Research and Development (SCRD). The SCRD is chaired by Chairperson, Central Electricity Authority, New Delhi and has representations from MoP, Academia, Industry, other Ministries. The representation of other Ministries in the SCRD ensures that overlapping of research under the proposed scheme is avoided.

The Apex Committee of IMPRINT-I chaired by Secretary (Higher Education), MHRD and with members from the participating Ministries has been constituted for approval of the proposals and monitoring the progress of implementation. The Apex Committee has the authority for financial sanction and financial closure of the projects. The National Co-ordinator for IMPRINT-I viz. IIT, Kanpur is responsible for convening the Apex Committee meetings.

IIT-Madras is the National Co-ordinator for implementation of the UAY scheme. Monitoring of the progress of projects under the UAY Scheme is done by an inter-ministerial committee constituted for this purpose.

Administering of R&D Projects

The Apex Committee on R&D namely Standing Committee on R&D (SCRD) is headed by Chairperson, CEA and the composition of the Committee is given in Appendix-3. The Standing Committee on R&D (SCRD) is the apex body that evaluates the research projects and also monitors implementation of the scheme objectives.

Four Technical Committees have been duly constituted to administer the R&D Projects in the areas of Thermal, Hydro, Transmission, Grid, Distribution and Energy Conservation. The composition of Committees are given in Appendix-4 to 7. The four Technical Committees assist SCRD by closely monitoring and steering the projects to successful completion.

Funding Mechanism:

Projects approved under the RSoP and IHRD schemes are fully funded by the MoP. However, in case of projects taken up by the Industries under the R&D under NPP Scheme, the project cost is shared by the concerned Industry and the MoP on 50:50 basis.

For projects approved under the UAY Scheme, half of the project cost is funded by the Ministry of Human Resource Development (MHRD), 25% is borne by the MoP and the remaining 25% by Industry.

For Projects approved under 'Energy' domain of IMPRINT-I Scheme, the cost of funding the projects is shared equally between MHRD and the MoP. Thus, funding support to the extent of 50% is extended by the MoP.

Project monitoring:

Quarterly Progress Reports and Utilization Certificates are submitted by the project implementing organization to the R&D Management Division of CPRI. Further, the Four Technical Committees and the SCRD monitor the progress of the on-going projects.

During the 12th Five Year Plan and the subsequent three year action plan period, CPRI has funded 25 projects under the "R&D under NPP" scheme, 63 projects under RSoP scheme and 38 projects under IHRD Scheme. Some of the projects aim at design and development of indigenous technologies with the objective of cost reduction, import substitution and employment generation. The deliverables of the projects help in development of innovative solutions thereby adding to the knowledge capital on the particular priority area and also acts as prior art for the future research.

In-House Research & Development Projects (IHRD)

In-House Research & Development Projects serve to develop technology and expertise to cater to the future needs of the Indian power industry. These projects are proposed by scientists and engineers of CPRI after careful analysis of the current technological requirements and conditions prevailing in the Indian Power Sector. The projects proposed by the scientists and engineers are recommended by Technical Committees (Thermal, Hydro, Transmission, Grid, Distribution & Energy Conservation Research) and then approved by Standing Committee on R&D (SCRD), for projects above Rs. 50 Lakhs and by Director General, CPRI for projects with outlay upto Rs. 50 Lakhs.

For the year 2020-2021, following is the summary of the ongoing In-House Research & Development Projects at CPRI:

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
1.	Development of gasification reactor system for conversion of multi fuel to syngas	Materials Technology Division, CPRI, Bengaluru	91.00	2 years
2.	Run-of-the-River low head micro hydroelectric system for off-grid micro grid operation	Materials Technology Division, CPRI, Bengaluru	93.50	2 years
3.	Improvement in Composite Polymeric Insulator Characteristics with Nano Filler Additives for Outdoor DC Applications	Insulation Division, CPRI, Bengaluru	48.47	1.5 years
4.	New Generation Ethylene Vinyl Acetate (EVA) Nano-composites with high UV shielding properties for Photovoltaic Modules	Insulation Division, CPRI, Bengaluru	27.50	1.5 years
5.	Development of Polymeric Films for High Energy Density Capacitors Application	Dielectric Material Division, CPRI, Bengaluru	94.60	1.5 years
6.	Computational design and Development of Green Insulating fluids for power transformers: Renewable non-edible oil	Dielectric Material Division, CPRI, Bengaluru	27.28	1.5 years
7.	Development of test method for studies on pollution performance on composite insulators to be used on DC systems	UHVRL, CPRI, Hyderabad	164.00	1.5 years
8.	Development of vegetable ester based Nano fluids for transformers	Dielectric Material Division, CPRI, Bengaluru	40.70	1.5 years

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
9.	Development of LDPE, MDPE and HDPE Nano-composite for DC Cable Application	Cables & Diagnostic Division, CPRI, Bengaluru	105.00	2 years
10.	Development and demonstration of ultra-capacitors and lead-acid batteries based hybrid storage for a 5 kW solar-powered micro-grid	Capacitors Division, CPRI, Bengaluru	49.50	2 years
11.	Development and demonstration of 1kW soluble lead redox flow battery system for solar energy and retrieval	Electrical Appliances Technology Division, CPRI, Bengaluru	77.00	2 years
12.	Smart Transmission through Wide Area Measurement System to control and co-ordinate HVDC/FACTS devices	Power Systems Division, CPRI, Bengaluru	110.00	2 years

For the year 2020-21, following is the summary of the completed In-House Research & Development Projects at CPRI:

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
1.	A Novel Optoelectronic Technique for Online Partial Discharge Monitoring of Transformers	Cables & Diagnostic Division, CPRI, Bengaluru	36.00	2 years
2.	Wide Area Measurement System (WAMS) based Fault Signature Analysis for fault detection and location assessment using measurements from Phasor Measurement Units (PMUs)	Power Systems Division, CPRI, Bengaluru	49.35	3 years

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
3.	Evaluation of the co-firing characteristics of Alternative Fuels mixed with high ash Indian coals for power generation applications	Materials Technology Division, CPRI, Bengaluru	33.00	2 years
4.	Study of AC Corona Phenomena and power loss for 1200 kV conductors and characterization of corona discharges from line / substation components	UHVRL, CPRI, Hyderabad	132.00	2 years
5.	Study of Electric Field Environment of HVDC Transmission Lines	UHVRL, CPRI, Hyderabad	114.00	3 years
6.	A study on online partial discharge measurement of power cables using inductive couplers and noise elimination by wavelet technique	Cables & Diagnostic Division, CPRI, Bengaluru	92.00	3 years
7.	Evaluation of re-ignition circuit by replacing the air gap with vacuum interrupter bottles.	High Power Laboratory, CPRI, Bengaluru	105.00	2 years

Research Scheme on Power (RSoP) Projects

The project proposals are invited from academia, power utilities, and research institutes. The projects proposed by the scientists and engineers are recommended by the Technical Committee on Transmission, Grid, Distribution & Energy Conservation, Hydro and Thermal Research and then approved by Standing Committee on R&D (SCRD), for projects above Rs.50 Lakhs and by Director General, CPRI for projects with outlay upto Rs.50 Lakhs.

For the year 2020-2021, the following is the summary of the ongoing RSoP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1.	Performance improvement of steam generator through the enhanced hydrophobic surface	Indian Institute of Technology, Bhubaneswar	49.98	2 years
2.	High temperature erosion characteristics of boiler tube materials of sub-critical and supercritical thermal power plants and prediction of critical erosion regions through CFD modelling	CPRI, Bengaluru	49.86	2 years
3.	IEC 61850 Compliant SF6 Monitoring System for Gas Insulated Switchgear	VSSUT, Burla	48.00	2 years
4.	Development of Nanocrystalline Materials for Solid Oxide Fuel Cells working at 600 degree C	KITS, Coimbatore	27.46	1.5 years
5.	Post Combustion Carbon Capture & Sequestration (CCS) Plant on a Coal Fired Thermal Power Plant – Feasibility Study	RKDF University, Bhopal	38.50	1.5 years
6.	Analysis of Performance of Inclined Plate Anchors Embedded in Geosynthetics Reinforced Soils for Transmission Tower Foundations	IISc., Bangalore	31.96	1.5 years
7.	Investigations on Control Flexibilities of Grid Integrated Solar Photo Voltaic Energy Conversion System	NIT, Warangal	31.10	1.5 years
8.	Development of High-Power and High-Energy Density Solid-State Hybrid-Energy Storage Device	Pondicherry University, Puducherry	59.24	1.5 years
9.	High Capacitance (50F to 200F) Graphene Supercapacitors for Storage of Power from Renewable Energy Sources	CMET, Thrissur	71.28	1.5 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
10.	Design and Development of RF Sensors for Identification and Localization of Incipient Discharges in GIS	IITM, Chennai	38.40	1.5 years
11.	Design and Development of a Cost Effective & Energy-Efficient Grid-Connected Pumped Hydro System employed with Sensor-Less PMBLDCM	NIT, Meghalaya, Shillong	32.09	1.5 years
12.	Model Order Reduction for Simulation Acceleration in Power Electronics	NIT, Srinagar	7.02	1.5 years
13.	Design, Development and Validation of a New Adaptive Digital Relaying Scheme for Power Transformer	IIT, Roorkee	47.73	1.5 years
14.	Bio-processing of Coal Industrial Effluent and Coal Fines Recovery using Aquatic Plants and Phototrophs	CIMFR - CSIR, Dhanbad	36.85	1.5 years
15.	Design and Development of 5m Long Single Phase HTS Cable	IIT, Kharagpur	51.21	1.5 years
16.	Development of Electricity Based Clean and Efficient Cooking Technology Suitable for Indian Cookware	Indian Institute of Technology, Kharagpur	36.21	1.5 years
17.	Design of Fault Tolerance and Reconfiguration Control for Megawatt Power Electronic Converters Fed Variable Speed Pumped Storage Unit	Indian Institute of Technology, Roorkee	48.25	1.5 years
18.	Design and development of tools for detection and prevention of cyber-attacks in smart grid energy management systems (EMS)	Indian Institute of Technology, Bhubaneshwar	49.92	1.5 years
19.	Computational feasibility studies on the development of high temperature superconducting magnetic energy storage (SMES) systems	Lovely Professional University, Punjab	19.98	1.5 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
20.	Transmission Line Protection in the Presence of Bulk Solar Photo Voltaic Power Plants	Indian Institute of Technology, Kharagpur	48.40	1.5 years
21.	Thermoelectric Power Generator for Clean Energy Generation by Recycling Waste Heat Generated in Power Plant	IIT, Kanpur	50.00	1.5 years
22.	The unsteady aerodynamic response in LP turbine blade and its control under part load conditions	Indian Institute of Technology, Roorkee	38.64	1.5 years
23.	Development of plasma torch for efficient disposal of municipal solid waste	CSIR-Central Mechanical Engineering Research Institute, Durgapur	21.67	1.5 years
24.	Design, operation, and control of Distributed Generation (DG) integrated unified power quality conditioner (UPQC) in electric grid	Indian Institute of Technology, Guwahati	32.28	1.5 years
25.	Design, Implementation and Analysis of Wireless Power Transfer and PV System for Battery Charging of Passenger e-Bus	National Institute of Technology, Trichy	32.40	1.5 years
26.	Design and Development of Improved Control Techniques for Unified Power Quality Conditioner with Distributed Generation (UPQC-DG)	Birla Institute of Technology and Science, Pilani	21.09	1.5 years
27.	Design and Development of Efficient Induction Cooker suitable for Vessels of Different Material	National Institute of Technology, Warangal	14.28	1.5 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
28.	Day Ahead Solar Power Forecasting for Indian Climatic Zone	Central Power Research Institute, Bangalore	50.00	2 years
29.	Adaptive protection schemes for micogrids with grid - connected and islanded mode of operation	Indian Institute of Technology, Roorkee	30.00	2 years
30.	Erosion-Corrosion Studies on Thermal Sprayed Conventional and Nanostructured Coatings	Indian Institute of Technology, Madras	68.00	2 years
31.	Experimental and computational analysis of heat sink application for optimal performance by developing low cost natural filler reinforced composite material	NIT, Silchar	22.63	2 years
32.	Development of Blue Light Emitting Diode packages	M.S. University of Baroda, Vadodara	49.50	2 years
33.	High performance PFC based LED Drivers working under Stringent AC Supply	Government Engineering College, Bikaner	34.76	2 years
34.	Studies to improve the performance of fault location algorithm for multi-location shunt fault in transmission line-A case study of Chhattisgarh State	National Institute of Technology, Raipur	27.00	2 years
35.	High-Flux Solar Simulator (HFSS) for High-Temperature Solar Thermal Research	IIT, Kanpur	60.00	2 years
36.	Designing and Tailoring of Hierarchical Graphene Carbon Nanotubes and activated Carbon for High Performance Hybrid Super capacitor	NIT, Rourkela	54.38	2 years

The following is the summary of the completed RSoP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1.	Development and AC Characterization of 2nd Generation High Temperature Superconductor (HTS) based Modular SFCL System	Inter-University Accelerator Centre, New Delhi	49.60	2 years
2.	Development of High temperature Low Sag Nano composite Core	SIT, Tumkur	28.00	2 years
3.	Development of Control Strategies for Grid Connected PV System utilizing the MPPT and Reactive Power Capability	Indian Institute of Technology, Kanpur	31.25	2 years
4.	Characterization and development of silicone rubber-EPDM Nano composites as outdoor insulating material for EHV applications	Indian Institute of Technology, Madras	61.00	2 years
5.	Studies on Development of Guidelines for Best Practices in Water & Waste Usage in Coal Based Thermal Power Plants	Excellence Enhancement Centre for Indian Power Sector, New Delhi	42.00	2 years
6.	Investigation on the operation and control of multiple distributed generation sources in micro grid (Phase-II)	National Institute of Technology Karnataka (NITK), Surathkal	25.00	2 years
7.	Modular Induction Stove Design for Indian Cookware	Indian Institute of Technology, Gandhinagar	12.79	0.5 year

Projects under R&D under National Perspective Plan (NPP)

The project proposals are invited from Academia, Power Utilities, Electrical Equipment manufacturing companies and Research Institutes. The proposals are recommended by Technical Committees (Transmission, Grid, Distribution & Energy Conservation, Hydro and Thermal Research) and approved by Standing Committee on R&D chaired by the Chairperson, CEA, New Delhi.

The Ministry of Power is also supporting the research projects under UAY and IMPRINT (IMPRINT-I) schemes/programmes of MHRD. Since the research projects under both the schemes/ programmes are mainly collaborative in nature involving participation of industry and the IITs, these are being considered as R&D proposals/projects under National Perspective Plan (NPP) scheme.

For the year 2020-2021, the following is the summary of the ongoing NPP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1.	Development of a Selection Methodology for Road header and Tunnel Boring Machine in Different Geological Conditions for Rapid Tunneling	CSIR-Central Institute of Mining & Fuel Research & Indian Institute of Technology, (Indian School of Mines), Dhanbad	289.20	2 years
2.	Development of polymer nano-composites for EHVDC Lines and diagnostics adopting laser induced breakdown spectroscopy (LIBS)	IIT, Madras	268.41	2 years
3.	Study of photo biological safety of LED lamps and luminaire	CPRI, Bangalore	400.00	2 years
4.	Investigation on flow instabilities in draft tube at off-design operation of hydraulic turbines	IIT, Roorkee	175.00	2 years
5.	Establishing Novel Erosive Wear Test Facility for Testing of Materials Used in Hydroturbine Components	IIT, Madras	125.00	2 years
6.	Development of intumescent fire retardant nano-composites for medium voltage cable sheathing applications	The Energy and Resources Institute, Bangalore	134.00	2 years

The following is the summary of the completed NPP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1.	Low cost silicon rubber insulator	Raychem RPG Pvt Ltd., Gujarat	141.90	2 years

Ongoing UAY-I Projects under National Perspective Plan (NPP) Schemes

Sl. No.	Title of Project	Organization	Total Sanctioned Cost (Rs. in Lakhs)	Duration
1.	Development of a high efficiency, high pressure ratio 'Micro Steam Power Pump Block' of 100 kW capacity	IISc, Bangalore	204.00	3 years

Ongoing UAY-II Projects under National Perspective Plan (NPP) Schemes

Sl. No.	Title of Project	Organization	Total Sanctioned Cost (Rs. in Lakhs)	Duration
1.	Development of Highly Efficient Low Cost Insulation for power plants	IIT, Jodhpur	93.47	3 years
2.	Understanding the Evolution of Residual Stress During Repair and Refurbishment of Gas Turbine Components via Laser Additive Manufacturing	IITM, Chennai	66.04	2 years
3.	Development of Wankel Expander/Compressor based heat pump system for high temperature applications	IITM, Chennai	158.12	3 years
4.	Highly porous 3 D graphene composites for protecting electronic equipment from electromagnetic interference (EMI)	IITM, Chennai	162.45	2 years
5.	Development of Novel SMA Bearing Supports and Retrofit for Enhanced Performance and Durability of Rotating Machinery	IIT, Patna	182.26	3 years

Ongoing IMPRINT Projects under National Perspective Plan (NPP) Schemes

Sl. No.	Title of Project	Organization	Total Sanctioned Cost (Rs. in Lakhs)	Duration
1	A Software Tool for the Planning and Design of Smart Micro Power Grids	Indian Institute of Technology, Guwahati	202.92	3 years
2	Low Cost Indoor Occupancy and Climate Monitoring System for Energy Conservation	Indian Institute of Technology, Kanpur	88.75	3 years
3	Cognition and Control for Demand Management: Sensors, Actuators and Web Services for Smart Consumers	Indian Institute of Technology, Bombay	140.04	3 years
4	Data-Driven modelling, analytics and optimization techniques to manage building thermal demand	Indian Institute of Technology, Bombay	202.00	3 years
5	Power Converter Design and Implementations for Energy Efficient Applications using Wide-Band-gap Power Devices	Indian Institute of Technology, Kanpur	184.38	3 years
6	Decentralized Power Generation using Micro Gas Turbines	Indian Institute of Technology, Kanpur	398.96	3 years
7	Design, Development and Control of High-Speed Switched Reluctance Generator for Direct-Coupled Operation with Thermal Turbo-Machinery	Indian Institute of Science, Bangalore	395.00	3 years
8	Development and Application of Small Scale Bending Tests for Residual Property Assessment of High Temperature Materials in Turbines	Indian Institute of Science, Bangalore	221.52	3 years

Sponsored Projects by other Ministry / Department/Institutions / Organizations etc.

Earthquake Engineering & Vibration Research Centre

Sl. No.	Title	Sponsoring Organization	Duration (Start & Close)	Outlay (Rs. in lakhs)
1.	Seismic Performance Evaluation of Corroded RCC Frames by Shake Table Tests	BARC	December 2015 to March 2021	36.00

Energy Efficiency & Renewable Energy Division

Sl. No.	Title	Sponsoring Organization	Duration (Start & Close)	Outlay (Rs. in lakhs)
1.	Establishment of LED luminary test facility across various locations of India.	BEE	Jan 2018-Jan 2021	1620.00
2.	Establishment of automated EVSE (AC/DC) test facility	BEE	July 2020 – July 2022	1075.00

Metering & Utility Automation Division

Sl. No.	Title	Sponsoring organization	Duration (Start & Close)	Outlay (Rs. in Lakh)
1.	'Development of DLMS/ COSEM testing tool for Smart Energy Meter' jointly by CPRI, Bengaluru and CDAC, Thiruvananthapuram	Ministry of Electronics and Information Technology (MEITY)	Two years Started: 22nd April 2020	166.11

Information on Patents

The following Patent has been granted. The patent details are given below: -

Sl. No.	Patent Title	Patent Application No.	Date of Filing	Inventors Name
1.	Ash Micro-Spheres Based Thermal Insulation Refractory	350996 (568/KOL/2009)	31.3.2009	Dr. M.G. Anand Kumar Dr. S. Seetharamu

Section- 3

Evaluation & Certification




EVALUATION & CERTIFICATION

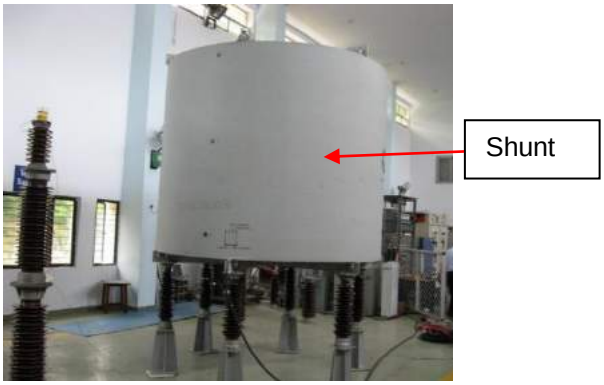
For the past six decades, the Institute has been serving the power sector in the field of evaluation and certification. CPRI is a Member of Short Circuit Testing Liaison (STL) and the Laboratories are accredited by NABL as per IEC/ISO 17025:2017, ISO 9001:2015, BIS. During the year 2020-21, a total of 82,619 evaluations were conducted on 17,486 samples for 3642 organizations which includes Central, State & Private Power Utilities, domestic and international electrical equipment manufacturers.

First –time Tests

Capacitors Division (CD)

TESTING OF SHUNT REACTOR:

- Testing of an air core, dry type, 1Ø, 33/ √3 kV, Shunt reactor of voltage 21 kV_{rms} with a requirement of test power of around 5.1 MVAR used in one phase of a 3-phase star connected arrangement in an ac system was tested as per IEC 60076-6:2007 & customer request. The test was virtually witnessed by engineers from M/s DMRC, Delhi, M/s SREX Power India Pvt. Ltd., Noida, M/s P2 Power Solution, Noida and the manufacturer.



A view of the air core shunt reactor

OVER VOLTAGE TEST AT - 40°C

- Testing and evaluation of HV Shunt capacitor of rating 120kvar, 3.8kV, Internal fuse type manufactured in India, as per IEC 60871-1-2014, for Over Voltage test at minus 40°C.

  Photograph of the test sample and test arrangement is shown below:

Arrangement for Over Voltage Test on 120kvar, 3.8kV, Fuseless HV capacitor

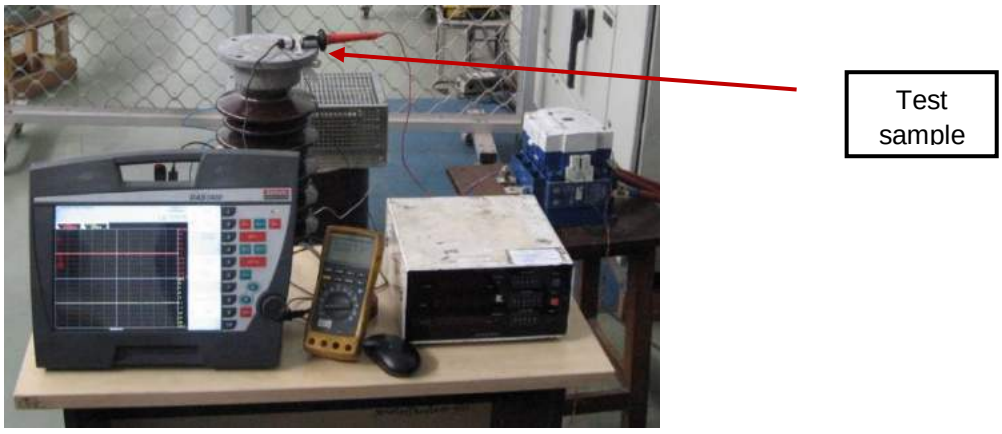
TESTING OF LINE TRAP

- Temperature rise tests on 0.5 mH, 4000 A, Line trap was carried out as per IEC 60353.

A view of the Line Trap

TESTING OF PRE-CHARGE RESISTOR

- Short Term Overload/ Energy Withstand test on 20 kW, 50 R, Pre - charge Resistor was tested.



A view of the test arrangement for testing of Pre-charge Resistor

TESTING OF THREE PHASE AIR CORE REACTOR

- Tesing of 11kV, 50Hz, 11.57 mH, three phase air core stacked filter reactor was tested as per IEC 60076-6:2007 & customer request. The test was virtually witnessed by the Engineers from the Certification body from Dubai and the Manufacturer from his works.

A view of the test arrangement for testing of Three Phase Reactor

TESTING OF EARTH DISCHARGE RESISTOR

- Constant Power test and Final Pulse test on 3 kW, 30 kΩ, Earth Discharge Resistor was carried out as per customer's protocols.

A view of the test arrangement for testing of Earth Discharge Resistor

Cables & Diagnostics Division (CDD)

Resistance to Flame Propagation test on 415 V, 1600 A Sandwich Busway as per IEC 61439-6 /2012 carried out for M/s. Godrej & Boyce Manufacturing Co. Ltd., Bengaluru. The photographs are as given below:


Resistance to Flame Propagation test on Sandwich Busway

- Pre-Qualification Test on 1C X 1200 Sqmm, 127/220(245) kV Cable System as per IEC : 62067 Edition 2.0 2011-11 successfully carried out for M/s. Polycab India Ltd., Halol, Gujarat.

Test sample after laying and installation of accessories

Cable laid inside the open tunnel with Zigzag pattern

Cable entering in to soil from tunnel

Lightning Impulse Voltage test set up

Energy Efficiency & Renewable Energy Division (ERED)

- Potential Induced Degradation (PID) test on Solar Photovoltaic (SPV) module was carried out in compliance with office memorandum from MNRE dated 02/01/2017 and IEC TS 62804-1:2015 for M/s. BHEL, Bengaluru.

Short Circuit (SC) Lab.

- Making & Breaking Capacities test carried out at 4000A 1000V DC on 1000V 2000A 4 Pole DC Switch as per Customer's instructions following IEC 60947 - 3 : 2020 for M/s. Delta Electronics India Ltd., Hosur.

Making & Breaking Capacities test carried out at 4000A 1000V DC on 1000V 2000A 4 Pole DC Switch

- Conditional Short-Circuit test at 415V 65kArms was carried out on a 415V 534kVAr APFC Panel for M/s. Schneider Electric Pvt. Ltd., Bengaluru

Conditional Short-Circuit test at 415V 65kArms on 415V 534kVAr APFC Panel

- Verification of short-circuit withstand strength test at 35kA DC for 1 second was carried out on 250V 630A DC Distribution Board as per IEC 61439-1:2011 & IEC 61439-2:2011 for M/s. Mass-Tech Controls Pvt. Ltd., Mumbai.

Verification of short-circuit withstand strength test at 35kA DC for 1 second on 250V 630A DC Distribution Board

STDS, Bhopal

- Test of Fault current making capacity and Short time current carrying capacity Test on Smart Meter of UC2 category was carried out as per IS 16444(Part 1),2015, Reference standard : IS 15884,2010

Test of Fault current making capacity and Short time current carrying capacity Test on Smart Meter of UC2 category

UHVRL, Hyderabad

- Artificial Pollution test using salt fog on 800 kV composite insulator of 9.2 Meter of was carried out for M/s. BHEL, Bengaluru. Facility of 80 Nozzles were created/arranged to conduct the test.

Artificial Pollution test using salt fog on 800 kV composite insulator of 9.2 Meter

- Dielectric tests on 800kV, 5000A, GIS Circuit Breaker carried out for M/s. GE T&D India Ltd., Chennai.

Dielectric tests on 800kV, 5000A, GIS Circuit Breaker

New Test Facilities Created

Materials Technology Division (MTD)

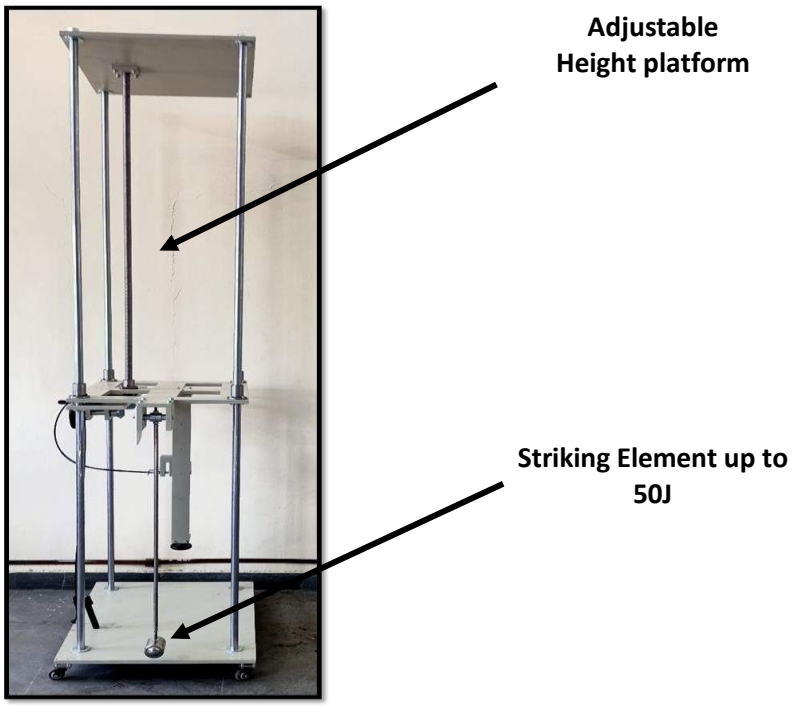
Field Vibration measurement facilities:

- The addition of these facilities are useful in field vibration measurement and also analysis of vibration signatures of conductors and rotating equipment.

STDS, Bhopal

Mechanical Impact Test facility

The facility for mechanical impact test is developed at CPRI, STDS, Bhopal in Supplementary Test Laboratory. The facility can be used for impact test on panel having assigned code up to IK 10 (20 J) as per IEC: 62262 and height of 3 meters. The striking element available with the lab is 1J, 2J, 5J, 10J, 20J and 50J. The impact test for higher coding using an element up to 50J can be done at the laboratory.

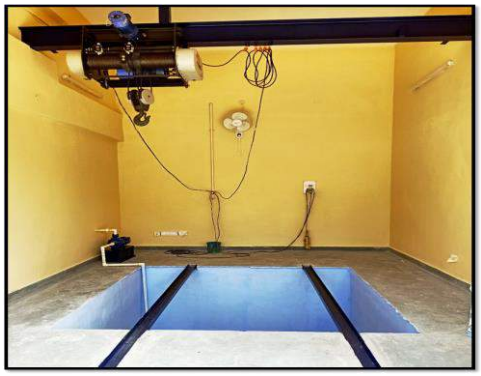


Mechanical Impact Test System

Striking elements of different energy level

Ingress protection test facility IPX7 and IPX8

- The facility for immersion of enclosures in water as per the IEC 60529, IEC 61439 and IEC 62271 has been developed at CPRI, Bhopal. A new set-up to facilitate IPX7 and IPX8 test has been established in Supplementary Test Laboratory. The dimension of the immersion tank is: Length 2.42m x Width 2.44m x Depth 2.13m.



Immersion of enclosures in water as per the IEC 60529, IEC 61439 and IEC 62271

Special Tests Conducted

Cables & Diagnostics Division (CDD)

- Inspection and examination of failed 250 MW, 16.5 kV Generator of M/s. KPCL, Raichur Thermal Power Station.

A View of End Windings from Exciter End

A View of the End Winding from Turbine End

Pre-commissioning Tests carried out at site for:

- 1000 Sq.mm 66 kV XLPE GIS Cable System for M/s. KEC International Ltd, Bengaluru
- 1000 Sq.mm 66 kV XLPE Cable System for M/s. Annabel Builders, Bengaluru for M/s. Sobha Indraprasatha, Bengaluru and M/s. Nandini Electrical Systems, Bengaluru
- 630 Sq.mm. 66kV XLPE Cable System for M/s. Tumakuru Machine Tools Park, Tumakuru.
- 630 Sq.mm. 66 kV XLPE Cable System for M/s. Goodwill Cables & Projects (P) Ltd, Bengaluru
- 3core x 300 Sq.mm 66 kV XLPE Cable System for M/s. Universal Cables Limited, Bengaluru

Electrical Appliances Technology Division (EATD)

- Special life cycle testing carried out on Li-ion batteries at 40^{o} C and Life cycle testing carried out on Li-ion batteries with mechanical loads as per customer requirements for M/s. Bosch Limited, Bengaluru

Earthquake Engineering & Vibration Research Centre (EVRC)

Seismic qualification of test carried out on the following equipments:

- 245kV Inductive Voltage Transformer & 420kV Current Transformer for M/s. Pfiffner Instrument Transformers Pvt. Ltd., Nashik
- 420kV Capacitor Voltage Transformer for M/s. ABB Power Products & Systems India Ltd., Vadodara

Seismic qualification test on 420kV Capacitor Voltage Transformer

- Vibration testing of Electrical Panel 150 kW Uninterruptible Power Supply for M/s. Schneider Electric IT Business India Pvt. Ltd., Bengaluru

Vibration testing of Electrical Panel

- Vibration and shock testing of Rolling stock equipment: Dry Type Transformer, Inductor, Driver display unit, Fire alarm unit, Pantograph etc. for Railways applications.
- Vibration and shock qualification test on relays, circuit breakers, energy meters, smart energy meters, communication equipment, control panel, relay panel, switchgears etc.

High Power Laboratory (HPL)

- Internal arc test on 245kV, 1200A live tank Current Transformer of M/s. GE T&D Ltd., Hosur
- Internal arc test 66kV Voltage Transformer of M/s. Hivoltrans Electricals Pvt. Ltd., Halol

Internal arc test 66kV Voltage Transformer

- Short circuit tests on 22kV of Lightning Arresters of M/s. Orange Power T&D Equipments Ltd., Bengaluru

Short circuit tests on 22kV of Lightning Arresters

- Short time current test on 420kV Center Break Disconnector of M/s. ABB Power Products and Systems India Limited, Vadodara.

- Special requirements for making and breaking test on class E2 Circuit Breaker 12kV, 1250A, 26.3kA metal enclosed GIS for M/s. ABB Ltd., Nashik

Metering & Utility Automation Division (MUAD)

- **DLMS protocol Testing:** Generally, direct current static energy meters are unidirectional as per Standard IS 15959 requirements. Direct current static energy meters, both Single & Three phase meters implemented with bidirectional features for TANGEDCO were tested as a special case. Additional OBIS codes for each new parameter added into the meters as per customer requirement were tested for certification.

Power Systems Division (PSD)

- CPRI team carried out GPS Synchronized End-To-End testing of Distance Protection Schemes at UPPTCL, 220 kV substation feeders.

GPS Synchronized End-To-End testing of Distance Protection Schemes

Testing & Certification for Overseas Customers

Cable & Diagnostics Division (CDD)

- Remote/Virtual witnessing of type testing on 4 Core X 185 Sq.mm, Aluminum Conductor, XLPE insulated, PVC Sheathed 0.6/1 kV Cable of M/s. Dubai Cable Company, Dubai by M/s. Dubai Electricity Water Authority (DEWA), Dubai is has been carried out for the first time in CDD from 27th July to 17th August 2020 . The name of the witnessing officials is as given below

  1) Mr. Khalid Al Ali. M/s. DEWA, Dubai
  2) Mr. Ashraf Moatasim, M/s. DEWA, Dubai
  3) Mr. Mazin Aziz, M/s. DEWA, Dubai

Remote/Virtual witnessing of type testing on 4 Core X 185 Sq.mm, Aluminum Conductor, XLPE insulated, PVC Sheathed 0.6/1 kV Cable

- Virtual witnessing was carried out for M/s. Wacker Chemicals, Middle East, FZE, Dubai, and UAE by Mr. Jaydeep Patel, Technical Manager, M/s. Wacker Chemicals, Middle East, FZE and Mr. Rachan Kumar, Engineer, M/s. SGS India Private Limited, Bengaluru

Virtual witnessing was carried out for M/s. Wacker Chemicals, Middle East, FZE, Dubai

Electrical Appliances Technology Division (EATD)

- Testing of kPH 180 Ah M-Type (Ni-Cd) batteries as per IEC 60623 :2017 for M/s. Saft America Inc., USA

Energy Efficiency & Renewable Energy Division (ERED)

- Inverter testing as per IS 16169/ IEC 62116 and IS 16221-2/IEC 62109-2 for M/s. Solar Edge Technologies Pvt. Ltd., Israel, M/s.Power One, Italy & M/s. Delta Electronics Pvt. Ltd., P.R. China

Earthquake Engineering & Vibration Research Centre (EVRC)

Seismic qualification tests on the following equipments:

- 12 kV Switchgear Panel for M/s. Schneider Electric Cikurang (SEC), Indonesia
- Nickel-cadmium cells installed in battery box for M/s. Saft Bordeaux, France
- LV Switchgear and controlgear assembly for M/s. Orel Corporation (Private) Limited, Sri Lanka and M/s. Electro Metal Pressing (Pvt.) Limited, Sri Lanka

High Power Laboratory (HPL)

Ability to withstand the dynamic effects of Short Circuit test on 500kVA, 24000/416V three phase transformer for M/s. Ekarat Engineering Public Company Ltd., Bangkok, Thailand.

Ability to withstand the dynamic effects of short circuit test on 500kVA, 24000/416V three phase transformer

- Short time current test on 132kV, 1600-800/1-1-1A Single phase current transformer for M/s. Energypac Engineering Limited, Dhaka, Bangladesh.

- Short time with stand current tests on 24kV Swithgear Panel for M/s Parsian Tablo Aria Co., Tehran, Iran.

Short time withstand current tests on 24kV Swithgear Panel

Short Circuit (SC) Lab.

- Short-time withstand current and peak withstand current tests at 31.5kA rms for 3 seconds with 69.3 kA peak on Link Box as per Customer's instructions for M/s. Evergrow Electrical Engineering Supplies Sdn Bhd, Selangor Darul Ehsan, Malaysia.

Short-time withstand current and peak withstand current tests at 31.5kA rms for 3 seconds with 69.3 kA peak on Link Box

- Short time withstand current test at 21.24kA rms for 1s and contact resistance measurement tests on 1000V Terminal Blocks as per IEC 60947-7-1 for M/s. Osada Co. Ltd., Tokyo, Japan. Mr. Kalirajan C from M/s. UL India Pvt. Ltd., Bengaluru witnessed the test.

- Thermal Short-circuit test through Screen at 14kA rms for 3 seconds was carried out on Single Core 26/45 kV 240 sq.mm Copper Cable as per Customer's instructions for M/s. Phelps Dodge International (Thailand) Ltd., Thailand.

Thermal Short-circuit test through Screen at 14kA rms for 3 seconds on Single Core 26/45 kV 240 sq.mm Copper Cable

- Short-time withstand current and peak withstand current tests at 25kA rms for 3 seconds and 62.5kA peak on main circuit of 3150A 12kV Air insulated metal enclosed switchgear for M/s. L&T Electricals and M/s. Automation Saudi Arabia Co. Ltd., Damam, Saudi Arabia.

- Dynamic & Thermal Short circuit test on Conductor at 33.04kA rms for 1s and 84.25kA peak out on 630A Type C Front & Rear T plug separable connector mounted on 3 x 185 sq.mm. 22kV XLPE Copper Cable with Terminations as per IEC 60502-4:2010, for M/s. 3M Vietnam Ltd., Vietnam.

- Temperature-rise and Determination of sound level tests carried out on 315kVA 33000/400V Three Phase Distribution Transformer as per IEC 60076-2:2011 & IEC 60076-10:2016 for M/s. KTK Electrical Engineering, Yangon Industrial Park, Zaykabar Compound, Yangon Region, Myanmar.

Temperature-rise and Determination of sound level tests on 315kVA 33000/400V Three Phase Distribution Transformer

STDS, Bhopal

- Routine tests prior to ability to withstand the dynamic effects of short circuit test on 200 kVA, 33/0.415 kV, 3-Phase Transformer for M/s. Reverie Power & Automation Engineering Ltd., Bangladesh. The test was witnessed by Shri Manoj Shankhwar.

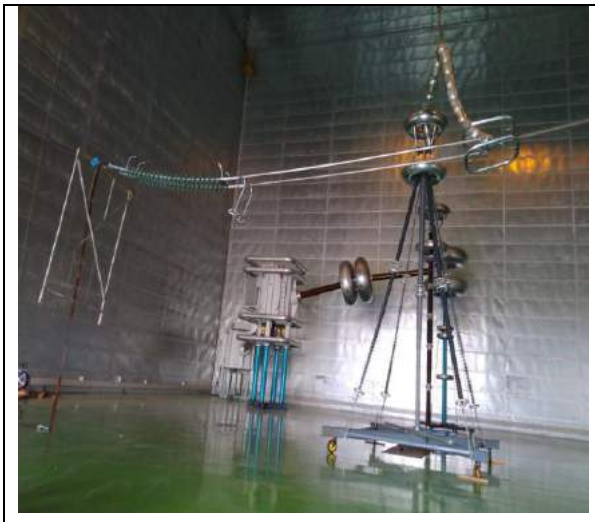
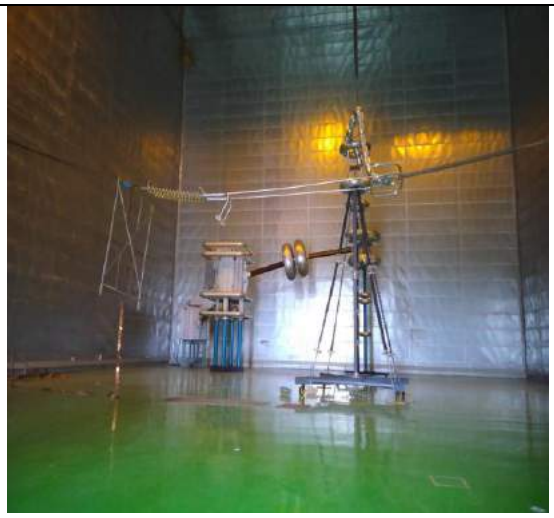
- Ability to withstand the dynamic effects of short circuit and thermal test on 200 kVA, 11/0.415 kV, and 250kVA, 11/0.415kV Three Phase Distribution Transformer for M/s. Power Breeze Engineering Ltd., Dhaka, Bangladesh. Mr. Anisur Rahaman Mamun, Sr. Deputy Manager witnessed the test on 8th to 11th December 2020.

- Ability to withstand the dynamic effects of short circuit test on 10000/14000 kVA, 33/11.55 kV, 3-Phase Power Transformer & Temperature rise test conducted on 10/14 MVA Transformer for M/s. Adex Corporation Ltd., Dhaka-1000, Bangladesh, on 26th February 2021 and on 5th & 6th March 2021 respectively. The test was witnessed by Mr. Vinod Agarwal, Engineer.

- Lightning Impulse test & Temperature rise test was conducted on 250kVA, 200kVA, 11/0.415 kV Distribution transformers for M/s. Power Breez Engineering Ltd, 43/5, Dhaka, Bangladesh, on 4th & 16th December 2020. The test was witnessed by Mr. Anisur Rahaman Mamun, Sr. Deputy Manager of M/s. Adex Coproration Ltd, Dhaka, Bangladesh in STL Lab. The test was witnessed by Mr. Vinod Agarwal, Engineer.

UHVRL, Hyderabad

- Lightning Impulse, Wet Power Frequency, Wet Switching Impulse Voltage withstand test, RIV & Corona tests performed on 275 kV & 132 kV Insulator strings with hardware fittings for M/s. Mosdorfer (Thailand) Co. Ltd., Thailand.

	
275 kV Double Tension Insulator String	132 kV Double Tension Insulator String

TESTING & CERTIFICATION UNDER UL (Underwriters Laboratories):-

- Short time withstand current at 6.42kA rms for 1 s, 10.2kA rms for 1 s, 12.84kA rms for 1s, 21.24kA rms for 1 s and contact resistance measurement tests on 1000V Terminal Blocks as per IEC 60947-7-1 for M/s. Osada Co. Ltd., Tokyo, Japan, on 25th August 2020.

- Short time withstand current at 10.2kA rms for 1 s and contact resistance measurement tests on 1000V 10/12 pole Terminal Blocks as per IEC 60947-7-1 for M/s. Osada Co. Ltd., Tokyo, Japan, on 18th December 2020.

TESTING & CERTIFICATION UNDER INTERTEK-ASTA:

- Temperature Rise, Di-electric, Lifting, Marking, IK and Clearance & Creepage test on 2500A Panel with ABB Switchgear & SE Switchgear for M/s. RITTAL India Pvt. Ltd., Doddaballapura

- Lifting, IP & IK test on 5000A Panel with ABB Switchgear & SE Switchgear for M/s. RITTAL India Pvt. Ltd., Doddaballapura

- Temperature Rise & LI on 11kV Air core filter reactor for M/s. Quality Power, Bengaluru

- Temperature Rise, IP /IK, Di-electric, Lifting, Marking, and Clearance & Creepage test on 4000A Panel for M/s. Modutec, Bengaluru

- Self-healing tests on Capacitors and SC tests on DBO for M/s. Schneider Electric, Bengaluru

- TR & STC on 11kV Indoor VCB Panel for M/s. C&S Electric Ltd., Haridwar

- Seismic testing on 690V, 3Ph PSC assembly for M/s. Electro Metal Pressing (Pvt.) Ltd., Sri Lanka

- 12kV, 1200A, 26.3kA H.T. VCB Panel 12kV, 1250A, 26.3kA Air Insulated Switchgear Panel with VCB Panel & 12kV, 1250A, 26.3kA H.T. VCB Panel of M/s. C&S Electric Ltd., Haridwar.

Membership of CPRI officers in International/ National Committees

The officers of CPRI are well represented in standardizing committees both at International and National level, viz., CIGRE Committee, IEEE, Academic Councils, Accreditation Panels, apart from being Empanelled Assessors for Laboratories, Research Committees, etc. CPRI contributes to evolve standards by participating in these committees. **The details of officers who were part of such committees during the year 2020-21 are provided in Appendix- 9.**

Section- 4

Consultancy Activities

CONSULTANCY ACTIVITIES

Capacitors Division (CD)

- On- line Partial Discharge (PD) test by acoustic emission technique was carried out on Generator Transformer, as a part of consultancy work of Diagnostic and condition monitoring of Power station equipment at site of M/s THDC Limited-TEHRI Hydro Electric Project, Tehri, from 21st to 24th March 2021

- Condition monitoring of 400kV class Extra High Voltage (EHV) circuit breakers, were carried out at Koteshwar Power Station, of M/s THDC Limited-KOTESHWAR Hydro Electric Project, Tehri, Uttarakhand, as a part of consultancy work of Diagnostic and condition monitoring of Power station equipment from 19th to 24th March 2021

Energy Efficiency & Renewable Energy Division (ERED)

- Instrumented and diagnostic energy analysis at Safina Towers Pvt. Ltd., Bangalore.

- Energy audit of 2 x 500 MW unit at Bhusawal Thermal Power Plant, Bhusawal

Special Consultancy Activities

Cables & Diagnostics Division (CDD)

- Condition Monitoring/ Diagnostic tests on Power Transformers for M/s. BWSSB, Bangalore

- Inspection and testing of 250 MW Generator for M/s. KPCL, Raichur Thermal Power Station

- ELCID (Electro Magnetic Core Imperfection Detection) test on Hydro Generator for M/s. KSEB, Kakkad Hydro Electric Project

- Condition Monitoring/ Diagnostic tests on Power Transformers for M/s. Delhi Transco Limited, Narela

- Condition Monitoring/ Diagnostic tests on Power Transformers for M/s. Delhi Transco Limited, Sarita Vihar

- Remaining Life Assessment (RLA) of Regulating and Rectifier Transformers for M/s. NALCO India Limited, Smelter Plant

- Partial Discharge test on Generators for M/s. NHPC Ltd., TLD-IV Power Station
- Sweep Frequency Response Analysis (SFRA) and Dielectric Frequency Response (DFR) test on Generator Transformer for M/s. NEEPCO Ltd., Doyang Hydro Electric Power Plant
- Condition Monitoring tests on Generators , Cross linked Polyethelene (XLPE) Cables and Potyard Equipment for M/s. NHPC Ltd., Chamera Power Station-III
- Condition Monitoring tests on Hydro Generators and ELCID and Wedge Mapping test on Hydro Generator for M/s. NHPC Ltd., Teesta-V Power Station
- Pre-Commissioning tests on Generator Transformer for M/s. NEEPCO Ltd., Doyang Hydro Wedge Mapping test on Hydro Generator Electric Power Plant for M/s. NHPC Ltd., Chamera Power Station-I
- Condition Monitoring/ Diagnostic tests on High Voltage Equipment for M/s. NHPC Ltd., TLD-III Power Station
- Diagnostic testing of 33/132/220 kV Equipment for M/s. SAIL, Rourkela Steel Plant
- Online witnessing of Diagnostic testing of Auto Transformer for M/s. NEEPCO Ltd., Ranganadi Hydro Electric Project (RHEP)
- Condition Monitoring/ Diagnostic tests on High Voltage (HV) Electrical Equipment and Study and Analysis of ELCID test data of Hydro Generator for M/s. THDC India Ltd., Tehri Hydro Power Plant (HPP), Koteshwar Hydro Electric Project (HEP) and Tehri Pumped Storage Plant (PSP).

Energy Efficiency & Renewable Energy Division (ERED)

- Environmental test for 12 kV, 10 kA, Station class, Gapless type porcelain housing lightning arrester as per IEC 60099-4:2014, Edition 3.0/ IS 15086(Part 4):2017 for M/s. Engineers Enterprise, Jaipur.

High Voltage Division (HVD)

- Carried out Soil Resistivity Measurement at the site of Dhaulasidh and Luhri Hydro Electric Project for M/s SJVN, Shimla
- Earth Resistance Measurement at 1000 MW Tehri Hydro Electric Project, THDC, Tehri
- Soil Resistivity Measurement at Dhaulasidh Hydro Electric Project site & Luhri Hydro Electric Project site.

Materials Technology Division (MTD)

- Study on turbine performance based on theoretical calculation with respect to radial clearance in Low Pressure turbine for M/s. KPCGPCL, Bengaluru

- Condition monitoring and health assessment of Electro Mechanical equipment for M/s. THDC India Limited, Rishikesh

Ultrasonic testing of turbine shaft in progress

- Corrosion mapping of boiler water wall tubes of Captive Power Plant Boiler M/s. BPSCL, Bokaro, Jharkhand.

Corrosion mapping of boiler water wall tubes in progress

- Corrosion mapping of water wall tubes in Unit # 2 for M/s.Farakka Super Thermal Power Station, NTPC Limited, Farakka

- Corrosion mapping of boiler water wall tubes in 1st pass of Unit # 5, Bandel Thermal Power Station, M/s. WBPDCL, Tribeni, Hooghly

- Corrosion mapping of water wall tubes of Unit # 3, Ramagundam Super Thermal Power Station, M/s. NTPC Limited, Ramagundam

- Estimation of plate thickness of penstock lines through Ultrasonic method at closed interval from valve house to Sharavathy generating station for 05 penstock lines. Sharavathy Generating Station, M/s. KPCL, Jog falls.

Thickness estimation Penstock pipe lines in progress

- Failure Analysis of water wall tube of 500 MW Boiler for M/s. NLC- Tamil Nadu Power Limited, Tuticorin

- Failure Analysis of Final Super Heater tube of 660MW Boiler for M/s. Sembcorp Energy India Limited, Super Critical Power Plant, Dist. SPSR Nellore

- Technical Audit & Critical Review of the reasons for demurrage charges at RTPS, M/s, Karnataka Power Corporation Ltd., Raichur

- Root Cause Analysis of failure of various boiler tube components of RTPS, Nabha power, NLC –TPSII Root cause Analysis for abnormal vibration in 60 MW hydro turbine at Sabarigiri HEP, KSEB, has been carried out and identified key issues associated with nozzle jet alignment with bucket centreline as well as thrust pad alignment with the machine axis.

- Root cause Analysis of two units for the abnormal corrosion in High & Intermediate Pressure-Low Pressure (HIP-LP) turbines of 660 MW Supercritical TPS for MPPGCL, Dongalia has been carried out and identified key issues associated with steam purity condition as well as environmental conditions followed during long shutdown.

- Study for determining the fly ash availability on ground conditions Unit 1 & Unit 2, Unit 4, Unit 6 & unit 7of RTPS, KPCL unit

Mechanical Engineering Division (MED)

- Design checking and approval of 400kV Double Circuit Line on Monopoles (Single, Dual type Poles) and Foundations (open cast type, mini pile types etc.) for M/s. TS TRANSCO, Hyderabad.

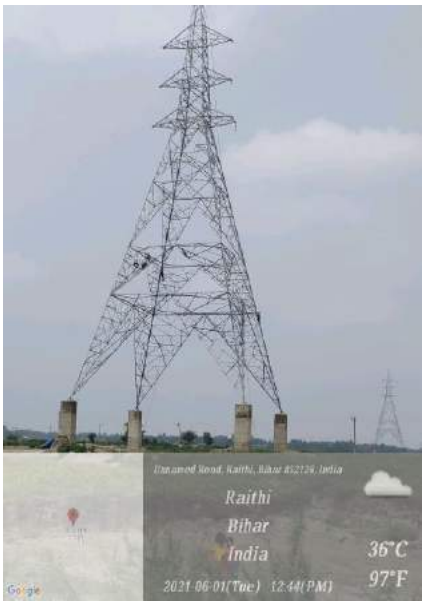
- Design checking and approval of 132kV & 220kV Double Circuit lines and Gantry Structures and Pile foundation for major rivers like Ganga, Kasi, Ghandak Etc. for M/s. BSPTCL, Patna.

- Design of 110kV D/C narrow based tower 220kV & 110kV M/C narrow based towers and raft/pile foundations for M/s. KSEB, Shoranur.

- Design of 132kV & 220kV D/C tower for Wind Zone-6 for various span combinations for M/s. OPTCL, Bhubaneshwar.

- Revalidation of existing 400kV D/C tower for M/s. HVPNL, Panchkula & M/s. PSPCL, Patiala.

- Vetting/Checking the Design Calculations & Drawings of Pile foundation with Raised Chimney type for 220 kV D/C Tower from Sahsarsa (New) –Begusarai Transmission Line with ACSR Zebra Conductor (Location AP34/0 & 36/0- Mid Stream-02 Locations) on Turnkey basis for M/s. Associated Power Structures, Patna



Power System Division (PSD)

- Study & Protection Audit of 400/220 kV substations & Generating Stations along their respective Switchyards of Bhakra Beas Management Board (BBMB), Chandigarh.

- Protection Audit for UPPTCL 220 kV Substations in U.P. for UPPTCL, Lucknow.

- Protection Audit of 765kV substation of D-TPS and 400 kV substation of B-TPS Anpara Thermal Power Plants Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited

- Capacitor Bank requirement studies for the Northern Region for year 2018-19-Northern Region Power Committee, Central Electricity Authority (CEA).

- Third party Protection Audit for WRTS-I, Phase I: PGCIL, Nagpur

- Testing of Power Management System - Special Protection Scheme (PMS-SPS) Controller on RTDS to M/s. Emirates Global Aluminum(EGA), Dubai by M/s. GE India Industrial Pvt. Ltd, Bengaluru. The test was witnessed by the clients remotely through Microsoft teams

- System studies for Luhri Stage –I, Stage –II and Sunni Dam Hydroelectric projects by M/s SJVNL

- Third Party Protection Audit for Koteshwar Hydro Power Plant, Tehri Development Power Corporation (THDC), Tehri, Uttrakhand.

- Study and Third Party Protection Audit for M/s KSTPS, Kota, Rajasthan

Ultra High Voltage Research Laboratory (UHVRL)

- Onsite RIV measurement at Vindhyachal Super Thermal Power Station

Section- 5

Promotional Activities

PROMOTIONAL ACTIVITIES

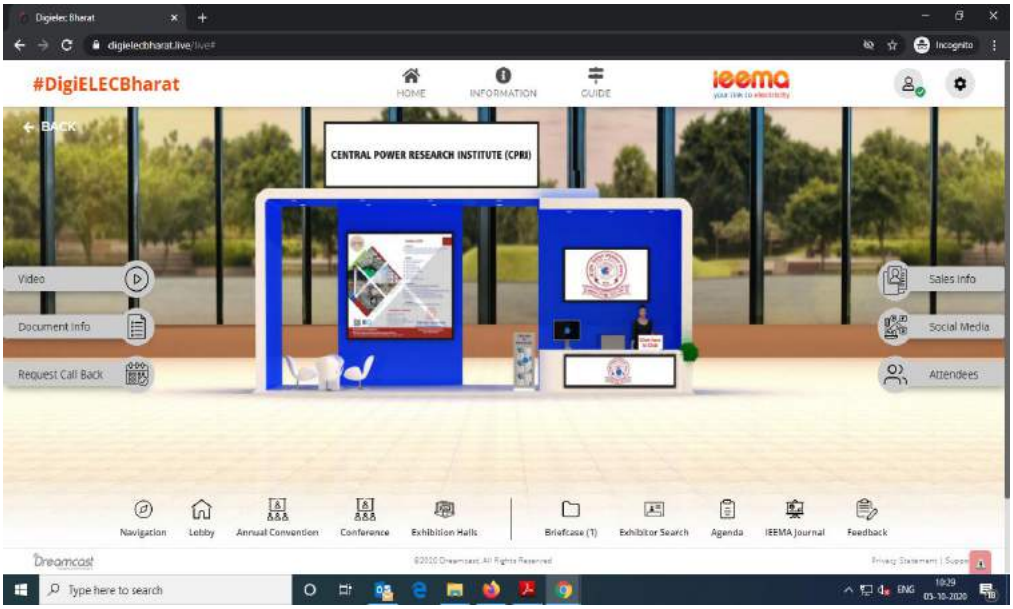
Important Conferences/Webinars/Training Programmes Organised

- Webinar on “Partial Discharge measurement on High Voltage Equipment” through online/virtual mode, at CPRI, Bengaluru, on 13th November 2020
- International Webinar on “EV Charging Infrastructure testing standards for India" held at CPRI, Bengaluru, on 29th April 2020.
- Webinar on “Design & Testing requirements of Transformers for Renewable Energy Application”, held on 19th March 2021.
- Two days online webinar on “Cyber Security for Hydro Power Plants” for NHPC officers conducted from CPRI, Bengaluru, on 27th & 28th October 2020.
- Five day webinar training programme on “Testing of Electrical Equipment” for the Engineers of M/s. NHPC Limited, Faridabad, was conducted from 19th to 23rd October, 2020.
- A Three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL) Kolkata (Batch-40) was conducted from 1st to 22nd March, 2021.
- One day Online Webinar on “Testing and Evaluation of Instrument Transformer”, held at STDS, CPRI, Bhopal, on 4th March 2021.
- One day Online Webinar on “Emerging Trends and Challenges in Transformer Design, Testing and Maintenance” held at STDS, CPRI, Bhopal, on 17th March 2021.
- One day webinar training programme on “High Voltage Testing, Evaluation and Performance of EHV/UHV Equipment”, held at UHVRL, CPRI Hyderabad, on 29th October 2020.
- One day webinar training programme on “High Voltage Testing of Insulators, Instrument Transformers and Switchgear”, held at UHVRL, CPRI Hyderabad, on 15th January 2021.
- “National Conference on High Voltage Engineering and Technology”- NCHVET 2021, through online held at UHVRL, CPRI, Hyderabad, on 12th March 2021.
- One day webinar training programme on “Condition Monitoring of Transformers through Insulating Oil Testing”, held at UHVRL, CPRI, Hyderabad, on 19th March 2021.

Participation in Conferences/Exhibitions

1) DIGIELEC BHARAT Virtual Exhibition 2020:

DIGIELEC BHARAT Virtual Exhibition, was organized by IEEMA, virtually for 4 days from 24th to 27th September 2020. CPRI participated in the Exhibition and displayed its Credentials, Research, Testing facilities, Consultancy and Training activities. The virtual stall witnessed by approx. 240 visitors from Industry, Research Organizations, Government etc.



CPRI Stall at DIGIELEC BHARAT Virtual Exhibition

Annual Customer Meet 2020:

Virtual Annual Customer Meet 2020:

- CPRI, Bengaluru conducted the Virtual Annual Customer Meet on 10th December 2020. A total of over 60 senior representatives from Industry and Utilities registered for the Meet.

  Shri. V.S. Nandakumar, Director General, CPRI in his opening remarks informed Customers about the latest developments and future plans of CPRI. This was followed by a presentation detailing the facilities, credentials and expertise of CPRI by Smt. Kamala Shankari.R, Engineering Officer Gr.4, Information & Publicity Division, CPRI, Bengaluru. Shri. Anupam Awasthi, Additional Director, Information & Publicity Division, CPRI, Bengaluru presented the Action Taken Report on the suggestions of the Customers made during the previous Meet 2019 held at Bengaluru.

  The Meet was followed by the Open House wherein many Customers expressed their views and suggestions for better utilization of CPRI facility.

On conclusion of the Open House, the Valued Customer Awards were presented to the Customers of CPRI for the year 2019-20. Shri. Ramadas, Engineering Officer Gr.3, Information & Publicity Division, CPRI, Bengaluru announced the winners in the categories of (1) Sponsored Research & Development; (2) Testing & Certification – (a) Indian (b) Overseas (c) Emerging Customer (d) Best State Utility; (3) Field Testing / Consultancy and congratulated all of them.

The Customer Meet ended with a Vote of Thanks to the Chair & Customers. Photograph is placed below:

Interaction with Customers during Open House

Section- 6

Training Activities

TRAINING ACTIVITIES & PROGRAMMES

Webinars / Conferences / Workshops / Training Programmes organised by CPRI during the year 2020-21

The phenomenal growth in the Indian Power Sector over past few years has magnified the need for absorption of latest technology in all the three spheres of Power Sector activity viz. Generation, Transmission, and Distribution. Coupled with this is the paucity of trained technical personnel and or skilled manpower.

Recognizing this need of the Indian Power Sector, CPRI has been in the forefront amongst many Training Institutes to disseminate the knowledge, assimilated by way of in-house research, through technical training programmes organized for:

- Upgrading the working skills of the Power Sector employees
- Training of personnel from Utilities / Industries/ Clientele from Companies in the Power Sector in relevant skill for their day to day activities.

Constant efforts are being put up by CPRI in training and continuing education schemes, from basic theoretical knowledge to practical hands-on training in electrical systems. Training Programmes and Courses conducted by CPRI are well designed and have made substantial impact on the confidence level of the engineers actually working on the systems, by way of changing their thought process while working. The training modules are so designed to comprehensively address the specific need of the Power Sector Utilities and have benefitted large number of employees from Indian Electrical Equipment Manufacturers, Generation, Transmission and Distribution Companies for the past several years. The training courses help the technical personnel/engineers by upgrading their occupational skills and improve their performance. This has led to the overall improvement in the efficiency in performance and competitiveness of the Indian Electrical Industry as a whole.

Workshops / Seminars / Conferences /Training Programmes /Tutorials organized by CPRI during the year 2020-21:

Capacitors Division

1) On-site training program on “Condition Monitoring and Diagnostic tests on Transofrmers including on-line Partial Discharge measurement by on-line acoustic emission technique”, Captive Power Plant, NALCO, Angul, held on 21st December 2020.

2) On-site training program on “Online partial Measurement by online Acoustic emission technique”, Smelter Plant, NALCO, Angul, held on 21st December 2020.

3) On-site training program on “Diagnosis & Condition Monitoring of outdoor HV Circuit Breakers & GIS Systems” for Engineers & Technical Staff of M/s. THEP, Uttarakhand, held at Koteswar Power House,M/s. THDC, India Ltd., Uttara-khand, held on 20th March 2021.

Cables & Diagnostics Division

4) Webinar on "Partial Discharge Measurement on High Voltage Equipment", held at CPRI, Bengaluru, on 13th November 2020.

5) Webinar on "Electrical Insulation and Flame-Retardant Properties of Polymers", held at CPRI, Bengaluru, on 27th November 2020.

6) One day Webinar on **"**Partial Discharge Measurement on High Voltage Equipment & Predictive Maintenance of 33 kV & 66 kV Cables" for M/s. Bengaluru Metro Rail Corporation Limited, Bengaluru, held on 17th December 2020.

Dielectric Materials Division

7) Webinar Training Programme on **"**Transformer Oil analysis" for the engineers of M/s. Druck Green Power Corpn. Ltd., Chukha, held at CPRI, Bengaluru, on 2nd November 2020.

8) Training Programme on "Transformer Oil analysis , DGA & Furan analysis " conducted for the engineers of M/s. Chemfab Alkalis Ltd., Puducherry, held at CPRI, Bengaluru, on 9th November 2020.

9) Webinar Training Programme on **"**Transformer Oil analysis , DGA , Furan analysis & Effects of PCB contaminated oils on environment**"** for the engineers of M/s. Chemfab Alkalies & BMRCL, Bengaluru , Online, held on 16th December 2020.

10) Training Program on "Condition monitoring of Transformers through Transformer oil analysis and Dechlorination of PCB contaminated oils", held at Bellary Thermal Power Station, KPCL, Bellary, on 6th January 2021.

11) Program on "Condition monitoring of Transformers through Transformer oil analysis and Dechlorination of PCB contaminated oils", held at Nagjari Power House, KPCL, on 27th January 2021.

12) Training Program on "Condition monitoring of Transformers through Transformer oil analysis and Dechlorination of PCB contaminated oils", held at Sharavathy Generating Station, KPCL, on 3rd February 2021.

Electrical Appliances Technology Division

13) One-day webinar conducted on "Need of Ingress protection testing for enclosures, importance and test procedures", held on 26th February, 2021.

14) One-day online webinar on "Lithium ion Batteries-Cell/ Battery Pack Manufacturing, Testing and Standardization", held on 19th March 2021.

Energy Efficiency & Renewable Energy Division

15) International Webinar (Online Seminar) on “EV Charging Infrastructure testing standards for India”, held at CPRI, Bengaluru, on 29th April 2020.

16) Training program on “Energy efficiency awareness” to BTPS engineers, held on 3rd December 2020.

High Voltage Division

17) Webinar on “Impulse Testing of Transformer”, held on 19th February 2021.

18) Webinar on “Evaluation of Transformer Insulation using Impulse Voltage”, held on 22nd February 2021.

High Power Laboratory

19) Online Webinar on “Testing requirements of MV Switchgear for Renewable Energy Application” held on 8th March 2021.

20) Online Webinar on “Design &Testing requirements of Transformers for Renewable Energy Application”, held on 19th March 2021.

Materials Technology Division

21) One day workshop Programme on “Corrosion mapping of boiler water wall tubes” for M/s. WBPDCL, Bandel Thermal Power Station, Bandel, held on 18th December 2020.

22) Workshop on “Boiler Tube Failure Analysis and Preventive Methods”, held at M/s. KPCL, Raichur Thermal Power Station, Raichur, held on 28th January 2021.

23) Workshop on "Condition monitoring of hydro power plant components", conducted at Sharavathy Generating Station, M/s. KPCL, Jogfalls, on 17th February 2021.

24) Online Webinar Training Programme on “Coal Quality Assessment and its impact on power plant performance”, held on 29th March 2021.

Power Systems Division

25) Three day webinar on “Power System Protection” for Indian Oil Corporation Ltd., organized by Power Systems Division, CPRI, Bengaluru, held from 27th to 29th October 2020.

26) Two days webinar on “Cyber Security for Hydro Power Plants” for NHPC officers, organized by Power Systems Division, CPRI, Bengaluru, on 27th & 28th October 2020.

27) Three day webinar on “Power Systems Protection”, organized by Power Systems Division, CPRI, Bengaluru, for Indian Oil Corporation Ltd., from 14th to 16th September 2020.

28) Two-day online training programme on “Protection Audit-Findings, Observations and Recommendations for Third Party Protection Audit of 220kV Substations of U.P.P.T.C.L.” for the engineers of UPPTCL, organized by Power Systems Division, CPRI, Bengaluru, on 25th & 26th November, 2020.

29) One day Online Webinar Training on “Synchrophasor for Real time monitoring of Smart Power Systems”, held on 4th December, 2020.

30) One day Online Webinar Training on “Cyber Physical Systems Security for Smart Grid” held on 11th December 2020.

31) Three-day online functional training on “Power system Protection” for Young Engineers of Indian Oil Corporation, held from 21st to 23rd December 2020.

32) One day online webinar on “Cyber Security with Real Time Simulation”, held on 8th January, 2021.

33) Three-day online functional training on “Power System Protection” for Young Engineers of Indian Oil Corporation Ltd., held on 20th to 22nd January 2021.

34) Two days online webinar on “Cyber Security for Hydro Power Plants” for the officers and executives of M/s. NHPC, Faridabad, held on 11th & 12th February 2021.

35) Two days online webinar on “Renewable Energies: Research Perspective” for Faculties and M. Tech. students from M/s. Government College of Technology, Coimbatore, held on 25th & 26th February, 2021.

36) Three days online training program on “Power Systems Protection” for Young Engineers of Indian Oil Corporation held from 17th to 19th March 2021.

R&D Management Division

37) Webinar on "Supercapacitors as Energy Storage Device", held through Video conferencing, held on 16th June 2020.

38) Webinar on "Electrifying Indian Home Cooking through Innovative Induction Stoves", held through Video conferencing, held on19th June 2020.

Regional Testing Laboratory, Noida

39) Online Webinar on "Condition Monitoring of Power Transformer & Allied Electric Equipment", held on 22nd March 2021.

40) Online Webinar on "High Voltage Testing of Power Cable, Transformer and Switchgear", held on 24th March 2021.

Short Circuit Laboratory

41) One Day Webinar on "Temperature Rise Tests on LV & HV Switchgear – Methodologies and Interpretations as per IEC Standards", organized by Short Circuit Laboratory, CPRI, Bengaluru, on 28th September 2020.

42) Online Webinar on "Test Methods and Requirements for Mechanical and Electric Power Connectors as per Latest Standards", held on 23rd March 2021.

Switchgear Testing & Development Station, Bhopal

43) Online Webinar on "Testing and Evaluation of Instrument Transformer", held at STDS-CPRI, Bhopal, on 4th March 2021.

44) Online Webinar on "Smart Meters: IS 16444 and IS 15959- Testing & Cases Studies", held at STDS-CPRI, Bhopal, on 9th March 2021.

45) Online Webinar on "Emerging Trends and Challenges in Transformer Design, Testing and Maintenance", held at STDS-CPRI, Bhopal, on 17th March 2021.

Training Division

46) One day webinar training programme on "Reactive Power Management" for Engineers of M/s. JKPDD, Jammu, organized by Training Division, CPRI, Bengaluru, held on 11th August 2020.

47) One day webinar training programme on "Transformer Oil Handling and Analysis" for Engineers of M/s. JKPDD, Jammu, organized by Training Division, CPRI, Bengaluru, held on 18th August 2020.

48) Five day webinar training programme on “Testing of Electrical Equipment” for the Engineers of M/s. NHPC Limited, organized by Training Division, CPRI, Bengaluru, held from 19th to 23rd October 2020.

49) Five day webinar training programme on “Testing of Electrical Equipment” for the Engineers of M/s. NHPC Limited, held from 1st to 5th February 2021.

50) One day webinar training programme on “Coal Based Power Generation, Coal Characterization and Coal Combustion and its Issues in Thermal Power Plants Boilers Components” for M/s. Kalpataru Institute of Technology, Tiptur, held on 19th February 2021.

51) Three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL), Kolkata (Batch-40), held at CPRI, Bengaluru, held from 1st to 22nd March, 2021.

UHVRL, Hyderabad

52) One day training programme on “High Voltage Testing, Evaluation and Performance of EHV/UHV Equipment”, organized by UHVRL-CPRI, Hyderabad, on 29th October 2020.

53) One day On-line Training Programme on “High Voltage Testing of Insulators, Instrument Transformers and Switchgear”, held on 15th January 2021.

54) National Conference on “High Voltage Engineering and Technology”- HVET - 2021 conducted online, on 12th March 2021.

55) Online Webinar one day Training Programme on “Condition Monitoring of Transformers through Insulating Oil Testing” held on 19th March 2021.

Section- 7

Capital Projects

CAPITAL PROJECTS

As the Power sector of the country is expanding, additional power capacity is being added and an addition of 78,000 MW Capacity was planned in the Twelfth Five-Year Plan. This demand for additional power calls for installation of additional equipment for generation, transmission and distribution of power. Additional equipment, in turn, bring in need for augmenting testing facilities. During the XI Five-Year Plan itself, the MoP, GoI approved several projects to enhance the research and testing facilities at CPRI.

XII Plan Proposals

CPRI has been sanctioned with Rs.1182.00 Crores by MoP, Govt. of India as Govt. Budgetary Support during 12th Plan period including Rs.80.00 Crores for R&D Schemes.

A project titled "Augmentation & New Facilities Projects", at a total cost of Rs.105.90 crore is approved and is under implementation from March 2014.

Another Capital project with an outlay of Rs.996.10 Crores comprising of two project components titled (i) "Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators and associated equipment-Outlay Rs.640.00 Crores" and (ii) "Establishment of New Test Facilities-Outlay Rs.356.10 Crores" under the 12th Five Year Plan, was approved as one project proposal by Finance Ministry & MoP vide order No.5/5/2014-T&R dated 5th January 2015 & is under implementation from April 2015.

3 YEAR ACTION PLAN PROPOSALS

"R&D Schemes of Ministry of Power is being implemented through CPRI" with an outlay of Rs.90.8284 crore was approved on 20th August 2018, comprising of In house Research Schemes of CPRI (IHRD), Research Scheme on Power (RSoP) and R&D under National Perspective Plan (NPP).

XII PLAN PROJECTS

The details of the XII plan projects/schemes are given in the table below:

Sl. No.	Title of the Proposal	Cost (in Crores)
I.	**'Augmentation and New Facilities Projects" of CPRI under XII Plan' at an estimated cost of Rs.105.90 Crores, comprises of following project components:**	
	(i) Upgradation of High Voltage/Ultra High Voltage Test facilities	14.00
	(ii) Upgradation of Real Time Digital Simulator	8.35

	(iii) Augmentation of Energy Meter & Calibration Laboratory	15.87
	(iv) Augmentation of Protocol and Meter Testing Laboratory	15.68
	(v) Establishment of test facility for (a) Solar PV based Grid tied Inverter systems (up to 500 kVA) and (b) Solar PV modules (up to 500 Wp)	28.00
	(vi) Augmentation, Modernization and Capacity Addition of Battery, Ingress Protection and Illumination test facilities	11.00
	(vii)Augmentation & Modernization of Diagnostics, Cables, Capacitors, Temperature Rise test, Environmental test facilities	13.00
II.	**"Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators and associated equipment" under XII Plan, at an estimated cost of Rs.640.00 Crores, comprises of following project components:**	
	I. Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators with associated equipment at High Power Laboratory, CPRI, Bengaluru.	509.00
	II. Upgradation of Short Circuit test facilities: A. Establishment of '350 MVA on line Short Circuit Test Station' at UHV Research Laboratory, CPRI, Hyderabad B. Establishment of Short Circuit Testing of Transformers, Excitation System for existing Generator	120.00 11.00
III.	**'Establishment of New Test Facilities' under XII Plan Proposals' at an estimated cost of Rs. 356.10 Crores**	
	Establishment of New Transmission Tower & Seismic Test Facility	
1	Establishment of transmission line tower test station and associated facilities	90.00
2	Augmentation of test facilities at STDS-CPRI, Bhopal	20.00
3	Augmentation of Pre-Qualification test facilities at CPRI, Bengaluru	11.50
4	Establishment and Augmentation of Short Circuit test facilities at CPRI, Bengaluru.	8.50
5	Relocation and Augmentation of Thermal Research Centre (TRC), Nagpur and Expansion of the Nagpur Unit	48.00

6	Enhancing Test Facilities of Regional Oil Testing Laboratories including Relocation of RTL, Kolkata	22.10
7	Establishment of 40 kA continuous current Temperature Rise test Facility at HPL, CPRI, Bengaluru	15.00
8	Establishment of Total Test Facility for Transformers at CPRI Western Zone	100.00
9	Setting up of Oil Testing Laboratory in the Western Zone	5.30
10	Establishment of Test facilities for Energy meter	10.00
11	Centre of Excellence for Non-Destructive Testing & Evaluation of Power Plant Components	8.00
12	Establishment of Phasor Measurement Unit (PMU) System Testing Calibration Lab.	6.65
13	Smart Grid Research Laboratory	11.05

Section- 8

Administrative Matters

ADMINISTRATIVE MATTERS

Governance

The following distinguished persons have joined the Governing Council and the Society of CPRI as members in 2020-21:

1) Shri. Alok Kumar, IAS, Secretary, Ministry of Power has assumed charge as President, Governing Council of CPRI

2) Shri. S.K.G. Rahate, IAS, Additional Secretary, Ministry of Power became the Member of CPRI Governing Council

The following distinguished persons joined the Standing Committee of CPRI as Members in 2020-21:

1) Shri. S.K.G. Rahate, IAS, Additional Secretary, Ministry of Power assumed as Chairman of the Standing Committee of CPRI

During the course of the year, the 84th Standing Committee Meeting of CPRI was held through Virtual Mode on 4th November 2020 and 85th Meeting of CPRI Governing Council and 43rd Annual General meeting of CPRI Society was held through Virtual Mode on 18th March 2021 to consider various issues pertaining to the Institute.

Important Events

- Dr. B.R.Ambedkar's 129th Birth Anniversary was celebrated at CPRI, Bengaluru, on 14th April 2020. Due to COVID-19, CPRI office was under lockdown. The Chief Administrative Officer garlanded and offered floral tributes to the Portrait of Dr. Bhimrao Ambedkar along with Security officials.

- 1st meeting of Committee for National Electricity Plan, 2022-2027 was held through video conferencing, on 6th August 2020. The meeting was attended by Director General, CPRI, Shri R A Deshpande, Additional Director and Dr. Tulika Bhattacharjee, Engg. Officer Gr.3, CPRI, Bengaluru.

- The first meeting of the National Electricity Plan (NEP) subcommittee on "Technological Advancement and Research & Development" was held through video-conferencing, on 14th September 2020. The meeting was attended by Director General, CPRI, Shri R A Deshpande, Additional Director, Dr Tulika Bhattacharjee, Engg. Officer Gr.3 and Shri Arka Chakraborty, Engg. Officer Gr.2, CPRI, Bengaluru.

- Local Inquiry Committee (LIC) members from VTU, Belgaum visited CPRI on 8th January 2021 for inspection of Lab., Infrastructure, Library, etc. in connection with continuation of VTU Research Centre at CPRI for the Chemistry and Chemical Engineering branches for the academic year 2020-21.

LIC Committee members visited Labs at CPRI, Bengaluru

- Meeting under the Chairmanship of Secretary (Power) to discuss "Hydrogen Economy in India" was held through video conferencing on 23rd March 2021, which was attended by Dr. Venkateswara Rao M, Joint Director and Shri Arka Chakraborty, Engg. Officer Gr.2, CPRI, Bengaluru.

Meeting of Technical Committee of Research

- Meeting of the Technical Committee on Grid, Distribution and Energy Conservation Research, for review of progress of projects was held through video conferencing, on 22nd April 2020.

- 22nd meeting of the Standing Committee on R&D (SCRD) for review of progress of projects and approval of new R&D projects was held through video conferencing, on 20th May 2020.

- Seventh meeting of Technical Committee on Thermal Research for review of progress of projects was held through video conferencing, on 23rd June 2020.

- Seventh meeting of Technical Committee on Hydro Research for review of progress of projects was held through video conferencing, on 30th June 2020.

- Seventh meeting of Technical Committee on Transmission Research for review of progress of projects was held through video conferencing, on 7th July 2020. The meeting was chaired by Dr. S C Srivastava, Professor, IIT, Kanpur. Members from CEA and POWERGRID participated in the meeting. Progress of ongoing projects were reviewed.

- Eighth meeting of Technical Committee on Grid, Distribution and Energy Conservation Research for review of progress of projects was held through video conferencing, on 10th July 2020. The meeting was chaired by Dr. S V Kulkarni, Professor, IITB, Mumbai. Members from CEA, BEE and IEEMA participated in the meeting. Progress of ongoing projects were reviewed.

- Seventh meeting of Technical Committee on Transmission Research for review of progress of projects was held on 7th August 2020 through video conferencing. The meeting was chaired by Dr. S C Srivastava, Professor, IIT, Kanpur. Members from CEA, POWERGRID and IEEMA participated in the meeting. Completed projects were evaluated by the Committee. Progress of ongoing projects were also reviewed.

- Eighth meeting of Technical Committee on Grid, Distribution and Energy Conservation Research for review of progress of projects was held on 14th August 2020 through video conferencing. The meeting was chaired by Dr. S V Kulkarni, Professor, IITB, Mumbai. Members from CEA, BEE and IEEMA participated in the meeting. Completed projects were evaluated by the Committee.

- Seventh meeting of Technical Committee on Transmission Research for review of progress of projects was held on 15th October 2020 through video conferencing. The meeting was chaired by Dr. S C Srivastava, Professor, IIT, Kanpur. Members from CEA, POWERGRID and IEEMA participated in the meeting. Completed projects were evaluated by the Committee. Progress of ongoing projects were also reviewed.

- Eighth meeting of Technical Committee on Grid, Distribution and Energy Conservation Research for review of progress of projects was held on 22nd October 2020 through video conferencing. The meeting was chaired by Dr. S V Kulkarni, Professor, IITB, Mumbai. Members from CEA, BEE, TANGEDCO, MNRE and IEEMA participated in the meeting. Completed projects were evaluated by the Committee.

- Meeting of the Technical Committee on Thermal Research, for review of progress of projects was held on 5th February 2021 through video conferencing.

Signing of MoUs

- A Memorandum of Understanding (MoU) was signed between Ministry of Power & Central Power Research Institute on the key performance parameters proposed for the financial year 2020-21, on 16th October 2020.

- Mr. Martin Murray, Chief Technical Officer (CTO) and Dr.Suman Basu, Head of Energy System of M/s. Mahindra Electric visited battery testing laboratory, CPRI, Bengaluru regarding validation of battery pack for electric vehicle, on 17th February 2021. MoU also signed between M/s. Mahindra Electric and CPRI.

Officer of M/s. Mahindra Electric

Activities Related to Women Employees

The Women's Cell looks after:

- Welfare of the women employees of the organization
- Addresses the issues/ grievances concerning women employees and facilitates redressal of the same
- Manages the Creche in CPRI colony and provides necessary guidelines for its smooth functioning

The internal complaints committee of Women's cell investigates the reported cases of sexual harassment of women employees in CPRI and submits its report to the disciplinary authority by recommending action to be taken against the accused employees. This is carried out as per the CPRI's Internal Policy for Prevention, Prohibition and Redressal of Sexual Harassment of Women at Workplace. The women's cell also looks into any other complaints by Women employees in workplace. The committee consists of five members from CPRI and one external member.

The crèche at CPRI is open for employee's kids and is housed in CPRI colony, Bengaluru. It is managed by women's cell with support of CPRI management and with two caretakers. Due to Covid-19, Creche has been closed since April 2020.

The chairperson of women's cell also recommends to the management of CPRI the sponsoring of women employees to attend women related conferences and arrange talks pertaining to women related matters. Felicitations were arranged by the women's cell to superannuating women employees of the institute during the year.

International Women's Day was celebrated on 8th March 2021 at CPRI. Due to pandemic and to maintain social distancing, the program was conducted online. All Women Employees and all Heads of the Divisions of CPRI participated in the program.

Function was presided over by Dr J.Sreedevi, Women welfare Officer/Joint Director, CPRI, Bengaluru who delivered the welcome speech. On this occasion, Shri. V. S. Nandakumar, Director General of CPRI addressed the Women employees.

Smt. Bhanu Ravinder, Advocate and External Member for CPRI Internal Complaints Committee was the Chief Guest of the function and delivered the speech on "Empowerment of Women". The program was concluded with vote of thanks by Smt R. Arunjyothi, Joint Director, CPRI, Bengaluru.

Internal Policy for Prevention, Prohibition and Redressal of Sexual Harassment of Women at Workplace is in force in the Institute and No sexual harassment case was reported during the year 2020-21.

Statement indicating total number of employees in the Institute and number of women in each category as on 31st March 2021

Sl. No.	Post(s)	No. of employees	No. of women employees	Percentage of women employees
1	Director General	1	-	-
2	Director	0	-	-
3	Additional Director	11	0	0.00
4	Joint Director	43	7	16.28
5	Chief Administrative Officer (SG)	1	-	-
6	Chief Accounts Officer (SG)	1	-	-
7	Scientists/Engg Officers	128	17	13.28
8	Scientists/Engg Assistants	26	2	7.69
9	Non-Tech Officers	8	3	37.50
10	Office Staff/Stenographer	86	33	38.37
11	Library staff	1	1	100.00
12	Technicians	63	-	-
13	Technical Attendant/Attendant	60	4	6.67
14	Drivers/Cook-cum-care taker	9	-	-
15	Multi-Tasking Staff	29	4	13.79
	Total	**467**	**71**	**15.20**

Staff Strength of the Institute as on 31st March 2021

Sl. No.	Posts	Number of employees
1	Director General	1
2	Director	0
3	Additional Director	11
4	Joint Director	43
5	Chief Administrative Officer (SG)	1
6	Chief Accounts Officer (SG)	1
7	Scientific / Engg. Category	154
8	Technicians	63
9	Administrative & Supporting Staff	133
10	Supporting Technical Staff	60
	Total	**467**

Vigilance Activities

'Vigilance Vision' of CPRI is preventive over punitive actions, to enforce meaningful, workable and objective systems/procedures, to develop trust and transparency in all transactions, to prevent financial or other losses due to any malpractices, to promote pride and self-esteem of the Organization and its employees and time bound action in all spheres of activities.

Several system Improvements have been undertaken with IT usage and web enabled technologies like display of Status of booking of test dates available in CPRI website. Technology communication with customers through emails, payment of test and consultancy fees through wire transfer, RTGS, e-tendering, posting of Formats for submission of research proposals, project reports in CPRI website. Transparency in all the technical, financial and administrative activities of CPRI is ensured.

On the occasion of Vigilance Awareness Week Integrity pledge was administered to the employees on 27th October, 2020 and the activities of Vigilance Awareness Week-2020 was observed in the Institute from 27th October 2020 to 02nd November 2020 with the theme **"सतर्क भारत, समृद्ध भारत - Satark Bharat, Samriddh Bharat (Vigilant India, Prosperous India)**".

The following activities were taken up during the campaign Vigilance Awareness Week 2020:

- The allotment of quarters to the employees were reviewed assessing with the norms of allotment and found no illegal occupations in the campus.

- A review was taken up regarding payments made to the outsourced personnel and confirmed that all the payments are made through bank account by the service provider and the other statutory dues are remitted in time.

Rotation Transfer Policy of CPRI was followed as per the policy. CPRI has also formulated a policy on Agreed and Officers of Doubtful Integrity (ODI) list and Officials with Doubtful integrity are being reviewed. CPRI has also been furnishing the requisite reports under provision of Probity among Government Servants to Ministry of Power on monthly basis.

Vigilance Cases

There was no vigilance cases during the Financial year 2020-21.

Information on Right to Information Act

CPRI has Right to Information (RTI) cell to respond RTI applications and the RTI cell consists of CPIO, APIO & Appellate Authority under the Ministry of Power. The nominated RTI cell office bearer are Dr. P. Thomas, Additional Director, CPRI, Bengaluru as Appellate Authority, Mr. M. Janardhana, Joint Director, CPRI, Bengaluru as Central Public Information Officer and Mr. G. Kishore Kumar, Engg. Officer Gr.4, CPRI, Bengaluru as Central Assistant Public Information Officer.

The sumoto discloser of the organization information is uploaded in web site of CPRI (www.cpri.res.in) under the RTI act 2005, section 4 with all the details of staff, organization and updated on daily basis.

The data on no. of applications received and replies sent to applicants during the year 2020-2021 i.e., from 01.04.2020 to to 31.03.2021 is given below.

No. of Applications received	Applications directly received by CPRI	Applications forwarded by MOP	Applications forwarded by others	Applications transferred to other departments	Applications Rejected under the various clauses of section-8 RTI
66	47	19	Nil	1	7

All the RTI applications responded by RTI cell is within the specified period.

Liaison Officer for SC/ST & PWD Welfare Activities

Activities relating to Liaison Officer SC/ST & PWD & OBC Welfare Activities:

Shri P Kaliappan, Joint Director and Shri T Mallikharjuna Rao, Joint Director, CPRI, Bengaluru served as Liaison Officers for SC/ST & PWD and OBC categories respectively during the year 2020-21. Reservation registers and Roster registers were updated for the year 2020-21.

Shri Achary Thalloju, Hon'ble Member of National Commission for Backward Classes (NCBC) visited CPRI, Bengaluru on 30th March 2021 and reviewed the progress made by the Institute in implementing the reservation policy. On this occasion, DG CPRI, Liaison Officer-OBC, Chief Administrative Officer along with other officials were present.

Visit of Shri Achary Thalloju, Hon'ble Member of National Commission for Backward Classes (NCBC) to CPRI, Bengaluru

Representation of Scheduled Caste, Scheduled Tribe & OBC as on 31st March 2021:

Group	Total	SC	ST	OBC	Others
A	**165**	38	14	33	80
B	**134**	27	21	29	57
C	**139**	34	14	38	53
MTS	**29**	12	3	1	13
Total	**467**	**111**	**52**	**101**	**203**
Percentage	-	23.77	11.13	21.63	43.47

Representation of Physically Challenged Employees as on 31st March 2021:

Sl. No.	Post(s)	No. of employees	No. of physically challenged employees	Percentage of physically challenged employees
1	Director General	1	-	
2	Director	0	-	-
3	Additional Director	11	-	-
4	Joint Director	43	-	-
5	Chief Administrative Officer (SG)	1	-	-
6	Chief Accounts Officer (SG)	1	-	-
7	Scientists/Engg Officers	128	5	3.91
8	Scientists/Engg Assistants	26	1	3.85
9	Non-Tech Officers	8	0	0.00
10	Office Staff/Stenographer	86	3	3.49
11	Library staff	1	-	-

12	Technicians	63	-	-
13	Technical Attendant/Attendant	60	4	6.67
14	Drivers/Cook-cum-care taker	9	-	-
15	Multi-Tasking Staff	29	-	-
		467	**13**	**2.78**

Public & Staff Grievance Cell

Central Power Research Institute has a separate cell for redressing the staff and public grievances. The Grievance Redressal Mechanism is a part and parcel of the machinery of CPRI Administration. The role of Public and Staff Grievance Cell is primarily to assist the management in redressing the Staff and Public grievance petitions. The grievances received by the Cell are forwarded to the concerned Section/Division who are dealing with substantive function linked with the grievance for redressal under intimation to the complainant. The complaints are either received in person, by post, Fax, e-media or through online CPGRAMS portal. CPRI web portal has direct link to CPGRAMS portal www.CPGRAMS.IN. The CPGRAMS offers to the staff and public the facility of lodging online grievances, on-line reminders and online view of current status of the grievances. The guideline indeed is that the CPRI deal with every grievance in a fair, objective and just manner. The monitoring of grievances received and disposed of by CPRI under Public & Staff Grievances Cell is on a regular basis.

During the year 2020-21, CPRI has redressed several grievance petitions including 4 grievances from online grievance portal and 4 grievances from other means (through letter, email, RTI etc.). Grievance petitions received from the staff, ex-employees and general public are on matters related to pension, recruitment and promotion policies, research schemes, medical and staff welfare measures. Suggestions, comments made by the general public have been appreciated and replied.

Summary of online grievances received and disposed:

Grievance Source	B/F Balance	Receipt During the Period	Total Receipts	Cases Disposed of During the Period	Closing Balance as on 31/03/2021	Yet to Assess	At our Office
DARPG	0	0	0	0	0	0	0
Local/Internet	2	0	2	2	0	0	0
Pension	0	0	0	0	0	0	0
PMO	0	2	2	2	0	0	0
Total	2	2	4	4	0	0	0

CPRI Library and Information Centre, Bengaluru

Library and Information Centre was established in the year 1960. It is a special Library which mainly consists of Electrical and Power Engineering related documents. Presently Library and Information Centre occupies ground and first floor of the building situated at the centre of the campus. The Institute has a modern Library with more than sixty-five thousand documents consisting of Technical books, reports, standards, CD-ROMS, Audio Visual Educational Cassettes and back volumes of journals.

Library consists of Windows and Ubuntu Computer systems with internet connection. Wi-Fi facility has been provided for laptop users. CCTV Web cameras have been fixed in the Library and the entire building is under camera surveillance.

Library Collection for the year 2020-21:

Library and Information Centre has got a collection of 68778 documents, comprising of books, journals, back volumes, reports, standards-both Indian & International, technical papers, photocopies and reprints. This year total 105 documents are added in the stock which includes IEC, ASTM, BSI, ISO standards and other publications. Total number of users holding Library Membership is 158 numbers.

During this year, Library has subscribed Nineteen journals which include both Indian and International publications. Library also subscribed newspapers of different languages (Hindi, English and Kannada). In addition to Journals, Library takes annual subscription of CIGRE, IIPE Membership, Bureau of Indian Standards subscription and IEEE Xplore Digital Library Enterprise Level 1.

Library Infrastructure

Library Information centre has automated its in-house operations such as acquisition, circulation, cataloguing etc. through KOHA Library Management System open source software. Library also has Knowledge Management System portal repository for archiving standards and other digital documents.

Library has Web Online Public Access Catalogue (Web OPAC) Searching Area for the resources present in Library, Knowledge Management portal of digital documents, Internet browsing area for accessing e-resources and Laptop zone with Wi-Fi facility.

Section- 9

Finance & Accounts

Finance & Accounts

The Institute's financial performance during the year 2020-21 and for the last four years is given below:

Revenue earnings during the past five years

Year	Revenue (Amount in Lakhs)
2020-2021	14938.72
2019-2020	16007.71
2018-2019	20449.12
2017-2018	19104.61
2016-2017	18384.95

The services rendered were less due to Covid in the country and hence the revenue earnings reduced from Rs.18384.95 lakhs in 2016-2017 to Rs.14938.72 lakhs during the current year. During the year under report, as against the revenue realization of Rs.14938.72 lakhs, the expenditure on Revenue activities stood at Rs.14692.95 lakhs resulting in a surplus of Rs.245.77 lakhs. For the 32nd year in succession, the Institute has not drawn any Revenue Grant-in-Aid from the Government of India.

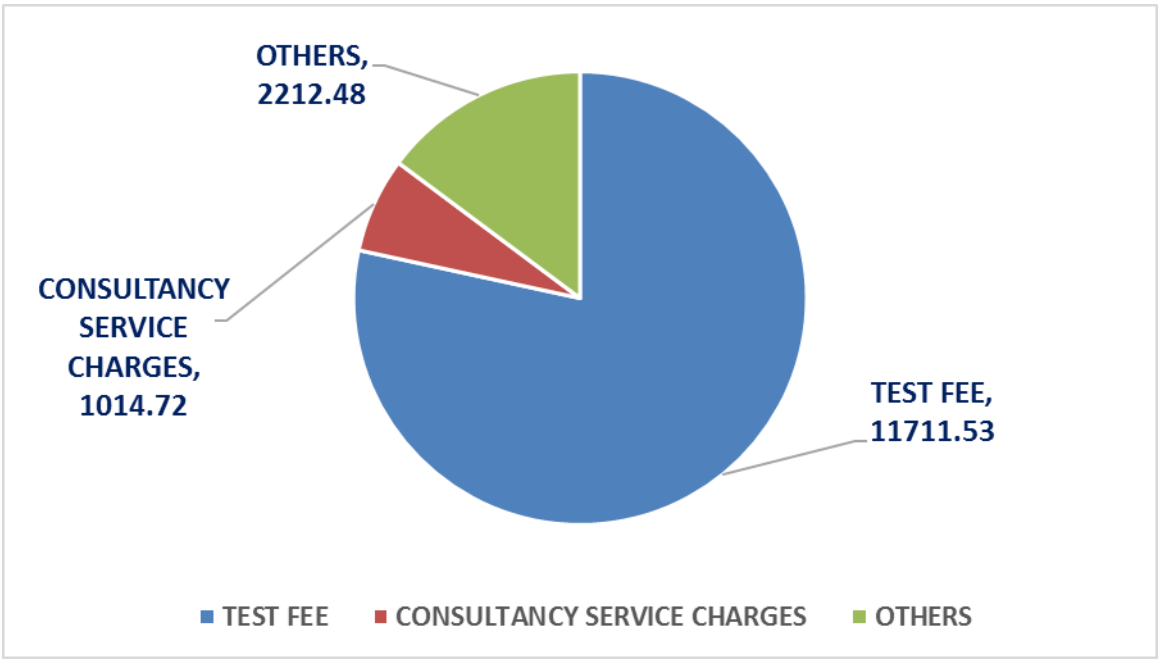
During the year, the expenditure under various heads has been as follows:

Revenue Expenditure	Rs.14,692.95 lakhs
Plan Capital Expenditure	Rs.4,020.16 lakhs
Plan IHRD Expenditure	Rs.10.79 lakhs
RSoP Schemes	Rs.222.48 lakhs
NPP Schemes	Rs. 154.92 lakhs

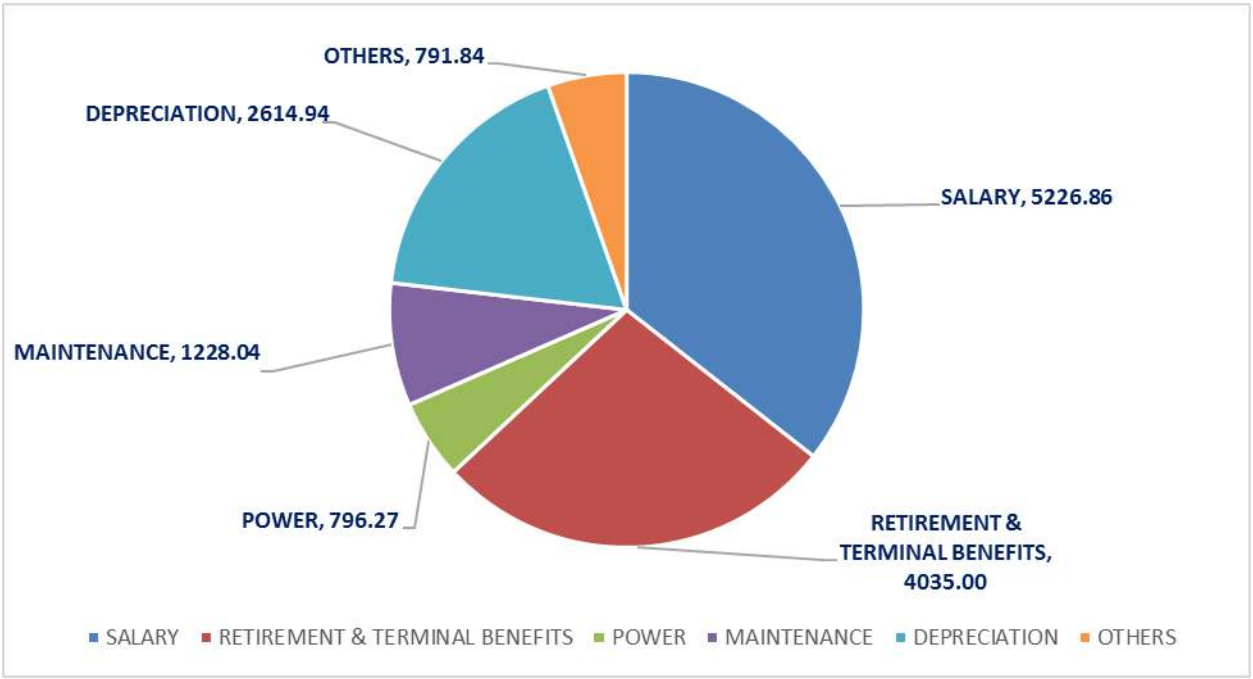
The Institute received Grants for Creation of Capital Assets & Grant-in-Aid (General) of Rs.8, 000.00 lakhs from the Government of India during the year. The details along with Auditors Report are furnished in Appendix–11.

As at the end of March 2021, the capital investment by the Government of India on the Institute has been Rs.1, 12,884.28 lakhs.

REVENUE DURING 2020-21 UNDER MAJOR HEADS (Rs. in Lakhs)



EXPENDITURE DURING 2020-21 UNDER MAJOR HEADS (Rs. in lakhs)



Section- 10

Activities In Official Language: Hindi

ACTIVITIES IN OFFICIAL LANGUAGE: HINDI

Remarkable achievements of the Institute in the field of Official Language Implementation during the year 2020 – 21 are listed below:

1. AWARDS :

TOLIC RAJBHASHA SHIELD - FIRST

CPRI, Bengaluru was awarded TOLIC Rajbhasha Shield – First in Category 3 (more than 50 employees) for its excellent performance in Official Language Hindi during the year 2019-20, which was given by Chief Post Master General, Karnataka Circle and Chairperson, TOLIC (2), Smt. Sharada Sampath to Shri B. Sridhar, Chief Administrative Officer (SG), CPRI, Bengaluru during second meeting of TOLIC held on 17th March 2021 at GPO, Bengaluru. Smt. Vidya L.N., Sr. Hindi Translator, CPRI, Bengaluru was also awarded a certificate during the occasion.

Shri B. Sridhar, Chief Administrative Officer receiving the award and Smt. Vidya L.N, Sr. Hindi Translator receiving the certificate from Smt. Sharada Sampath, Chairperson, TOLIC – II

2. Table Workshop

Table Workshops were conducted for Purchase and Civil Engineering Divisions on 9th November 2020 to guide the employees regarding use of Hindi in official work & presentation of statistical data of Hindi correspondence, and ensuring that the Name plates, Name boards, Sign Boards, Rubber Stamps, and Visiting Cards are in bilingual format.

3. Celebration of Hindi Month and Hindi Divas:

Hindi Month was celebrated at CPRI, Bengaluru during September 2020. Under this, Quiz and Translation (Hindi - English - Hindi) competitions were conducted online separately for officers and employees possessing working knowledge and proficiency in Hindi. Three prizes were awarded for each competition. Many officers and employees of the Institute participated with great enthusiasm in these competitions.

Under the incentive scheme, original Noting and Drafting work done by the officials were reviewed, based on which one first prize, two second prizes and three third prizes were awarded.

Hindi Divas was celebrated on 16th September 2020 at CPRI, Bengaluru by following Covid-19 protocols. Shri B. Sridhar, Chief Administrative Officer, welcomed the invitees. Shri V.S. Nandakumar, Director General-CPRI presided over the function and distributed the prizes to the winners of various competitions held during the month.

Celebration of Hindi Divas at CPRI, Bengaluru

4. Tenders / Publications in Bilingual:

A. All the Notice Inviting Tenders, E-Tenders, Corrigendum, Addendum, Notice Inviting Quotation etc. from Civil Engineering Division, Mechanical Engineering Division, and Purchase Section etc. are being issued and published in bilingual in Newspapers. Also, they are uploaded on the CPRI website simultaneously.

B. **Annual Report -** The Annual Report of the Institute for the year 2019-20 has been published in bilingual.

C. **CPRI News -** The four issues of the quarterly magazine of the Institute "CPRI News" have been brought out in bilingual.

D. **Brochures of all Seminars/ Invitation cards/ revised purchase formats, Roving Calendar in bilingual**

The brochures of all Seminars/ Conferences / Workshops / Training Programmes organised in the Institute, all Invitation cards, revised purchase formats, Roving Calendar of the Institute were brought out in Bilingual.

5. Awards under Incentive Scheme:

Noting and Drafting in Hindi
Various incentive schemes are in vogue in the Institute viz., Noting and Drafting. Cash Prizes under these categories are distributed every year on the occasion of Hindi Divas.

6. Facilities Provided:

A. Learn "A Word A Day" Scheme:

A new Hindi word per day with its English equivalent are displayed on the boards put up at the Main Gate and Head Office at CPRI, Bengaluru.

B. Learn "Ten words a Month" Scheme

Under "Learn and use Ten Hindi words per month scheme", Ten Hindi words with their English equivalents are released every month and all are requested to use these words in their day-to-day official work during the said month.

C. English-Hindi Phrases and Noting printed on file folders:

The file folders used in the Institute contains 40 English-Hindi Phrases and

40 English-Hindi Notings printed on each side so that every employee who does desk work can easily access the ready reckoner list of Hindi Phrases and Notings.

D. Supply of Forms:

Three kinds of forms (Hindi / Hindi–Kannada/ Hindi–English) are used in the Institute and are uploaded in CPRI Website.

i. 64 different types of forms are available in Bilingual.
ii. Only Hindi forms are issued to employees possessing the working knowledge of Hindi.
iii. Hindi-Kannada forms are issued to 'C' Category employees.

7. Web Site :

The web site of the Institute is available in Bilingual and is being updated from time to time.

8. Inspection by the Second Sub-Committee of Committee of Parliament on Official Language at Regional Testing Laboratory, Noida

RTL-CPRI, Noida, was inspected by the Second Sub-committee of Committee of Parliament on Official Language, on 10th December 2020. The Committee reviewed the progress made in the use of Hindi for official purposes and a detailed discussion was held with the Unit Head and Senior Officers of RTL-CPRI, Noida.

CPRI Officials receiving certificate during inspection by the second sub-committee of Committee of Parliament on Official Language in the presence of officials from Ministry of Power

9. TOLIC Activities:

The First meeting of the Town Official Language Implementation Committee, Bengaluru was held online on 18th November 2020. Chief Administrative Officer and Senior and Junior Hindi Translators from CPRI attended the meeting.

The Second meeting of the Town Official Language Implementation Committee, Bengaluru was held online on 17th March 2021. Chief Administrative Officer and Senior Hindi Translator attended the programme and received the award.

TOLIC Rajbhasha meeting for the year 2020-21 was conducted in CPRI, Bhopal, on 25th February 2021. More than 50 participants from various Central Government Offices in Bhopal took part in the meeting

TOLIC Rajbhasha meeting at STDS-CPRI, Bhopal

Section- 11

Appendices - 1 to 11

Appendix – 1

THE MEMBERS OF STANDING COMMITTEE AS ON 31ST MARCH 2021

Sl.no.	Present incumbent/Nominee	Status
1.	Shri. S.K.G Rahate, IAS Additional Secretary Ministry of Power Shram Shakti Bhawan Rafi Marg New Delhi – 110 001	Chairman
2.	Shri Ashish Upadhyaya, IAS Additional Secretary & Financial Adviser Ministry of Power Shram Shakti Bhawan Rafi Marg New Delhi – 110 001	Member
3.	Shri Goutam Roy Member (Power System) Central Electricity Authority Sewa Bhawan R.K.Puram, New Delhi – 110 066	Member
4.	Shri Raj Pal, IES Senior Adviser Ministry of Power Shram Shakti Bhawan Rafi Marg New Delhi – 110 001	Member
5.	Shri V.S. Nandakumar Director General Central Power Research Institute Post Box No. 8066 Bangalore–560 080	Member- Convener

Appendix-2

THE MEMBERS OF COMMITTEE ON TESTING & CERTIFICATION AS ON 31ST MARCH 2021

CHAIRPERSON

Member (Power Systems) Central Electricity Authority, Sewa Bhavan, R.K.Puram
New Delhi - 110 066

MEMBERS

Prof. G.R. Nagabhushana Prof. Emiretus (Retired) Deptt. of High Voltage Engg. Indian Institute of Science, IISC (Post) Bangalore-560 012	Shri D.K. Aggarwal Scientist F and Head, Bureau of Indian Standards Peenya Industrial Area, 1st Stage Tumkur Road, Bangalore-560 058
Shri A.K. Gupta Director (Commercial) NTPC Ltd., Engineering Office Complex, Sector-24, Noida-201 301 (U.P.)	General Manager, QA Vijay Electricals Ltd., Somajiguda, Hyderabad – 500 082
General Manager Electroporcelains Division Bharat Heavy Electricals Ltd., Prof. C.N.R. Rao Circle, Opp IISC, Malleshwaram Bangalore-560 012	Member (Commercial) West Bengal State Electricity Distribution Company Ltd., Vidyut Bhavan, Block – DJ, Sector – II Bidhannagar, Kolkatta - 700 091
Shri P. Bhaskar Technical Director Karnataka Power Corporation Ltd. # 82, Shakthi Bhavan, R.C. Road Bangalore- 560 001	Shri P. Narasimha Murthy Retd. Chairman, Karnataka Power Transmission Corpn. Ltd., No. 817, 6th Cross, MCR Layout, 5th Main, Vijayanagar, Bangalore - 560 040
Head (Product Development) Siemens Ltd., M.V. Switchgear & Switch Boards P.B. No. 85, Thane Belapur Road Thane - 400 601	Executive Director W.S. Test Systems Pvt. Ltd. 27th KM, Bellary Road, Doddajala Post, Bangalore – 562 157
Shri Sunil Misra Director General Indian Electrical & Electronics Manufacturers Association # 501, Kakad Chambers #132, Dr. A. Besant Road, Mumbai- 400 018	Business Technology Leader GE PCTDC, II Floor, III Phase, John F. Welch Technology Centre Pvt. Ltd., # 52, Export Promotion, Industrial Park, Phase II, Hoodi Village, Whitefield Bangalore - 560 066
Executive Director Southern Region Transmission System – I, Power Grid Corporation of India Ltd., Sahakara Bhavana, # 32, Race Course Road, Bangalore - 560 001	Shri V. S. Nandakumar Member Convener / Director General Central Power Research Institute Prof. C.V. Raman Road, P.B. No. 8066, Sadashivanagar P.O., Bangalore - 560 080

Appendix-3

THE MEMBERS OF STANDING COMMITTEE ON RESEARCH & DEVELOPMENT (SCRD) AS ON 31ST MARCH 2021

Sl. No.	SCRD - Main Committee	Name & Address	Position
1.	Chairperson	Shri Prakash S Mhaske Central Electricity Authority New Delhi	**Chairman**
2.	Addl. Secretary & F.A., Ministry of Power, Govt. of India	Shri. Ashish Upadhyaya Addl. Secretary and F.A. Ministry of Power Govt. of India Shram Shakti Bhawan New Delhi – 110 001	Member
3.	Economic Advisor Ministry of Power, Govt. of India	Shri Raj Pal Ministry of Power Govt. of India Shram Shakti Bhawan New Delhi – 110 001	Member
4.	Member Planning (R&D) CEA	Office of Member Planning Central Electricity Authority, 3rd Floor, Sewa Bhavan R K Puram, Sector -1, New Delhi – 110 066	Member
5.	Chairman of Technical Committee for Thermal Research	Prof. R. P. Vedula, Department of Mechanical Engg. IIT-B, Powai Mumbai – 400 076	Member
6.	Chairman of Technical Committee for Hydro Research	Prof. B.K. Gandhi Mechanical & Industrial Engineering, IIT Roorkee – 247 667	Member
7.	Chairman of Technical Committee for Transmission Research	Prof. S. C. Srivastava, Department of Electrical Engineering Indian Institute of Technology Kanpur – 208 016	Member
8.	Chairman of Technical Committee for Grid, Distribution & Energy Conservation	Prof. S. V. Kulkarni, FINAE Professor Department of Electrical Engineering IIT-Bombay, Powai, Mumbai – 400 076	Member

9.	DSIR-Scientist-G & above	Scientist 'G' Department of Scientific and Industrial Research New Delhi – 110 016	Member
10.	DIPP-IPR Expert	Deputy Secretary Dept. of Industrial Policy & Promotion (DIPP) Ministry of Commerce & Industry, Udyog Bhavan New Delhi – 110011	Member
11.	CEA	Shri A K Rajput Chief Engineer (R&D) Central Electricity Authority, 3rd Floor, Sewa Bhavan R K Puram, Sector -1, New Delhi – 110 066	Member
12.	Director General CPRI	Shri V S Nandakumar Director General, Central Power Research Institute Prof. C V Raman Road, Sadashivanagar, P.B. No.8066 Bangalore – 560 080	Convener
	Special Invitees		
13.	BHEL	Director (Incharge of R&D), BHEL, New Delhi	Member
14.	POWERGRID	Director (Incharge of R&D) Power Grid Corporation of India Ltd. 'Saudamini', Plot No. 2, Sector 29, Gurgaon– 122 001, Haryana	Member
15.	NTPC	Executive Director (NETRA) E3 ECOTECH-II, Udhyog Vihar, Gautam Budh Nagar – 201 306 (Uttar Pradesh)	Member
16.	NHPC	Director (Incharge of R&D) NHPC Office Complex Sector-33, Faridabad – 121 003	Member
17.	MNRE	Dr. P.C. Maithani Scientist G Ministry of New and Renewable Energy Block 14, CGO Complex Lodhi Road New Delhi - 110003	Member
18.	DST	Dr Sanjay Bajpai Head, Technology Missions Division(Energy, Water & all Other) Department of Science & Technology, Technology Bhavan, New Mehrauli Road New Delhi-110 016	Member

Appendix – 4

THE MEMBERS OF TECHNICAL COMMITTEE ON THERMAL RESEARCH AS ON 31ST MARCH 2021

Sl. No.	Affiliation	Position	Name & Address
1.	Professor from IIT-B, Mumbai.	Chairman	Prof. R.P. Vedula, Dept. of Mechanical Engg. IIT-B, Powai, Mumbai -400 076
2.	ED, NETRA, NTPC	Member	Executive Director NTPC-NETRA E3 ECOTECH-II, Udhyog Vihar Gautam Budh Nagar – 201 306 Uttar Pradesh
3.	ED- BHEL (Thermal)	Member	Executive Director BHEL-PEM Bharat Heavy Electricals Ltd. PPEI Building Plot No.25, Sector 16A Noida - 201 301
4	Chief Engineer, (TETD),CEA	Member	Chief Engineer (TE & TD) Central Electricity Authority Sewa Bhawan, 9th Floor South Wing, R K Puram, Sector-1 New Delhi- 110 066
5.	Representative of Generating Company (TATA Power Ltd.)	Member	Shri Ramakrishna Gadre Chief of Engineering The Tata Power Co. Ltd. Technopolis Knowledge Park CENTEC, Mahakali Caves Road Chakala, Andheri (E) Mumbai – 400 093
6.	CPRI representative	Member	Dr. Saravanan V Joint Director Materials Technology Division CPRI, Bengaluru
		Member	Dr. S K Nath, Joint Director TRC, CPRI, Nagpur
7.	Chief Engineer-R&D / Director-R&D, CEA	Permanent invitee	Chief Engineer (R&D), CEA, New Delhi
8.	CPRI	Member-Convener	Head R&D Management Division CPRI, Bengaluru

Appendix-5

THE MEMBERS OF TECHNICAL COMMITTEE ON HYDRO RESEARCH AS ON 31ST MARCH 2021

Sl. No.	Affiliation	Position	Name & Address
1	Professor from IIT - Roorkee	Chairman	Prof. B.K. Gandhi Dept. of Mechanical & Industrial Engineering, IIT Roorkee, Roorkee – 247 667
2	ED- BHEL (Hydro Expert)	Member	Executive Director (HE) Bharat Heavy Electricals Limited Piplani, Bhopal – 462 022
3	ED - NHPC (Hydro Expert)	Member	GM (O&M) Division NHPC Office Complex Sector-33 Faridabad – 121 003
4	ED – SJVNL (Hydro Expert)	Member	General Manager Electrical Design Department SJVNL, Mehta Niwas New Shimla – 171 009
5	Chief Engineer, CWC, New Delhi	Member	Chief Engineer, Design (E & NE) Central Water Commission Sewa Bhawan, R.K. Puram New Delhi – 110 066
6	Chief Engineer, (HETD),CEA	Member	Chief Engineer (HE & TD) Central Electricity Authority Sewa Bhawan, 7th Floor North Wing, R K Puram, Sector-1 New Delhi -110 066
7	Representative from CPRI	Member	Shri Janardhana M Joint Director MTD, CPRI, Bengaluru
		Member	Dr. R K Kumar Joint Director MTD, CPRI, Bengaluru
8	Chief Engineer-R&D/ Director-R&D, CEA	Permanent invitees	Chief Engineer (R&D) CEA, New Delhi
9	CPRI	Member-Convener	Head R&D Management Division CPRI, Bengaluru

Appendix-6

THE MEMBERS OF TECHNICAL COMMITTEE ON TRANSMISSION RESEARCH AS ON 31ST MARCH 2021

Sl. No.	Affiliation	Position	Name & Address
1	Professor from IIT-Kanpur	Chairman	Prof. S.C. Srivastava Department of Electrical Engineering Indian Institute of Technology Kanpur – 208 016
2	ED-BHEL (Transmission)	Member	Executive Director (TBG) Bharat Heavy Electricals Limited TBG Tower A, 5th Floor Advant Navis IT Business Park Plot No-7, Sector-142 Expressway Noida Noida – 201 305
3	ED-POWERGRID	Member	Executive Director (Technology Development) Power Grid Corporation of India Limited "Saudamini", Plot No. 2, Sector-29 Gurgaon – 122 001, Haryana
4	Chief Engineer (SETD), CEA	Member	Chief Engineer (PSETD) Central Electricity Authority Sewa Bhavan, 3rd Floor R K Puram, Sector -1 New Delhi – 110 066
5	Representative of state Transco (KPTCL)	Member	Director (Transmission) Karnataka Power Transmission Corporation Ltd., Kaveri Bhavan, K.G. Road Bangalore – 560 009
6	Representative of IEEMA	Member	Shri Mustafa Wajid Managing Director MHM Holdings Private Limited #52/1, Basappa Road Shanthinagar Bangalore – 560 027
7	Representative of CPRI	Member	Dr. P. M. Nirgude Additional Director UHVRL, CPRI, Hyderabad
8	Chief Engineer-R&D/ Director-R&D, CEA	Permanent invitees	Chief Engineer (R&D) CEA, New Delhi
9	CPRI	Member - Convener	Head R&D Management Division CPRI, Bengaluru

Appendix-7

THE MEMBERS OF TECHNICAL COMMITTEE ON GRID, DISTRIBUTION & ENERGY CONSERVATION RESEARCH AS ON 31ST MARCH 2021

Sl . No.	Affiliation	Position	Name & Address
1	Prof. S.V. Kulkarni, Professor IIT - Mumbai	Chairman	Prof. S.V.Kulkarni, FNAE Professor Department of Electrical Engineering IIT- Bombay, Powai Mumbai – 400 076
2	Representative from BEE	Member	Director Bureau of Energy Efficiency 4th Floor, Sewa Bhawan, R.K. Puram New Delhi – 110 066
3	Chief Engineer (DP&D), CEA	Member	Chief Engineer (DP&D) Central Electricity Authority R K Puram, Sector -1, 7th Floor Sewa Bhavan New Delhi – 110 066
4	Representative from MNRE	Member	Dr. P.C. Maithani Scientist- G Ministry of New and Renewable Energy Block 14, CGO Complex, Lodhi Road New Delhi – 110003
5	Representatives of TANGEDCO	Member	Chief Engineer (IC, R&D) TANGEDCO, 4th Floor Eastern Wing, 144, Anna Salai Chennai – 600 002
6	Representative of IEEMA	Member	Shri Mustafa Wajid Managing Director MHM Holdings Private Limited #52/1, Basappa Road, Shanthinagar Bangalore – 560 027
7	Representative of CPRI	Member	Shri Sudhir Kumar R Joint Director ERED, CPRI, Bengaluru
		Member	Shri Jyotibasu S Joint Director, ERED, CPRI, Bengaluru
		Member	Dr. Amit Jain Joint Director, PSD, CPRI, Bengaluru
8	Chief Engineer-R&D / Director-R&D, CEA	Permanent invitee	Chief Engineer (R&D) CEA, New Delhi
9	CPRI	Member - Convener	Head R&D Management Division CPRI, Bengaluru

Appendix – 8

Personnel Deputed Abroad for meeting / conference / pre – dispatch inspection of equipment during the year 2020-21

----------Nil----------

Appendix – 9

Membership of CPRI Officers in International / National Committees

Sl. No.	Name & Designation Shri / Smt. / Kum.	Member	Name of the Committee
1.	AnupamAwasthi Additional Director CPRI, Bengaluru	Chairman	BIS Sectional Committee on Low Voltage Switchgear and Control gear, ETD-07
2.	M.K. Wadhwani Additional Director STDS-CPRI, Bhopal	Chairman	High Voltage Switchgear & Control Gear Sectional Committee ETD-08 of BIS
		Member	BIS Power Transformers Sectional Committee ETD-16
			Fuses Sectional Committee ETD - 39
3.	B.A. Sawale Additional Director STDS-CPRI, Bhopal	Chairman	BIS ETD - 13
		Corporate Member	IETE
		Member	Expert Committee of Energy Metering-CBIP
			IEC TC13/WG11, WG14, WG15
			State Tariff Advisory Committee for MPSERC, Bhopal
4.	Swaraj Kumar Das Additional Director CPRI, Bengaluru	Member	BIS Sectional Committee, ETD – 34 & ETD - 07
5.	Dr. Pradeep M Nirgude Additional Director UHVRL-CPRI, Hyderabad	Principal Member	BIS ETD-48 - UHV AC Transmission Systems - Sectional Committee
			BIS ETD-19-High Voltage Engineering Sectional Committee
			BIS ETD - 36 – Tools & Equipment for live working - Sectional Committee
		Alternate Member	Indian National Committee (IEC)
			Standing Committee on Research and Development (SCRD)
			Bureau of Indian Standards (BIS) ETD-30 - Surge Arresters Sectional Committee

			Basic Electro Technical Standards and Power Quality Sectional Committee ETD – 01
6.	S. Sudhakara Reddy Additional Director CPRI, Bengaluru	Chairman	ETD-16 - BIS
		Member	ETD-08 - BIS
			ETD-47 - BIS
			TC-STL
			NEP-2022-27
7.	Dr. P Thomas Additional Director CPRI, Bengaluru	Chairman	ETD-03 BIS Technical Committee
		Member	ETD-43 – Environmental Standardization for Electrical and Electronic Products and Systems, Bureau of Indian Standards, New Delhi
8.	Shiva Kumar V Joint Director CPRI, Bengaluru	Member	IEC TC 57/WG 15 (Smart Metering Functions and Processes)
			IEC - TC 57 / WG 21: Interfaces and protocol profiles relevant to systems connected to the electrical grid
			IEC TC 13/WG15 (Data and Communication Security)
			BIS LITD-10 Power System Control and Associated Communications
			BIS ETD 13 Equipment for Electrical Energy Measurement & Load Control
			ISGAN-SIRFN (International Smart Grid Action Network – Smart Grid International Research Facilities Network)
			ISGF-WG 2: IoT and Smart Metering, AI and Analytics
			ISGF WG3: Digital Architecture and Cyber Security

		Member Convener	BIS-LITD-10, Panel 2: Security
9.	K.P. Meena Joint Director CPRI, Bengaluru	Principal Member	BIS ETD-09 Power Cables Committee
10.	R. Sudhir Kumar Joint Director CPRI, Bengaluru	Principal Member	BIS-Sectional Committee ETD-23 "Electric Lamps and their Auxiliaries"
			BIS-Sectional Committee ETD-28 "Solar Photovoltaic Energy Systems"
			BIS Energy Storage Committee, ETD-52
		Fellow	Society of Energy Engineers and Managers
		Certified "Energy Auditor and Energy Manager"	Bureau of Energy Efficiency, Ministry of Power, Govt. of India
11.	S. Jothibasu Joint Director CPRI, Bengaluru	Principal Member	BIS, Solar Pumps Committee
		Accredited "Energy Auditor and Energy Manager"	Bureau of Energy Efficiency, Ministry of Power, Govt. of India
		Life Member	Society of Energy Engineers and Managers (SEEM)
		Member	Certified Internal Auditor of ISO 9001
12.	M. Janardhana Joint Director CPRI, Bengaluru	Member	Indian Society of Non – Destructive Testing
13.	Dr. M. Selvaraj Joint Director CPRI, Bengaluru	Main Member	Use of structural steel in overhead transmission line tower and switch yard structures, BIS Committee – CED-7
			Standing committee of experts to investigate the cause of failure of towers, CEA, New Delhi
			Committee for Audit of Transmission lines tower with respect to design & life of towers - CEA / CEID, New Delhi

		Member Convener	Conductors and accessories on Overhead Lines, BIS Committee ETD 37, IEC/TC7 & TC11
		Life member	MIE, Institution of Engineer (I)
		Individual Member	SCB2 Overhead Lines, CIGRE, Paris
14.	Dr. V. Saravanan Joint Director CPRI, Bengaluru	Alternate Member	Clay and Stabilized soil products for construction, CED -30
		Life time member	Combustion Institute Pittsburg, USA
15.	Dr. Amit Jain Joint Director CPRI, Bengaluru	Principal Member	BIS-LITD 10 (Power System Control and Associated Communications Sectional Committee)
		Life Member	Computer Society of India
			Indian Wind Energy Association
			Institution of Engineers, India
			Indian Society of Technical Education
16.	T. BhavaniShanker Joint Director CPRI, Bengaluru	Chairman	Sectional Committee on Power Capacitors ETD-29 of BIS, New Delhi
		Member	NDT Level I Certified Engineer for Acoustic Emission testing as per American Society for Non-Destructive Testing (NDT).
			MT 14 “Series capacitors for Power systems” under IEC/TC 33
			Technical Evaluation Committee for setting up of calibration facility for C & tan delta bridges at NPL, New Delhi
			WG-23 “Shunt capacitors of Selfhealing type for voltages above 1000V for Power systems” under IEC/TC 33
			MT 21 “Shunt capacitors for voltages up to and including 1000V for Power systems” under IEC/TC 33

			MT-19, “Shunt capacitors for voltages above 1000V for Power systems” under IEC/TC 33
			MT-25, “Special application capacitors” under IEC/TC 33
			“Dynamic field data including validation” under IEC/TC 104-Environmental conditions, classification and methods of test
		Alternate Member	Environmental testing procedures Sectional Committee LITD 01 of BIS.
17.	S ShyamSundar Joint Director CPRI, Bengaluru	Expert Member	Committee constituted for formulation of criteria for planning of Distribution System
		Member	ETD 50 Sectional Committee of BIS
18.	Dr. J. Sreedevi Joint Director CPRI, Bengaluru	Principal Member	BIS - Wind Turbines Sectional Committee ETD - 42
			CIGRE Study Committee B4.72, DC Grid Benchmark Models for System Studies
		Alternate Member	HVDC Power Systems Sectional Committee, ETD-40
19.	G Pandian Joint Director CPRI, Bengaluru	Member	Sectional Committee, ETD-36, BIS
20.	P Kaliappan Joint Director CPRI, Bengaluru	Principal Member	ETD 35 Power Systems Relaying Committee
		Secretary	Panel 4 of LITD 10 PMU panel for PMU Testing and Certification
		Fellow	Institution of Engineers India
21.	G.R. Viswanath Joint Director CPRI, Bengaluru	Member	ETD-03 BIS Technical Committee
22.	Manoher Singh Takkher Joint Director STDS-CPRI, Bhopal	Member	High Voltage Switchgear & Control Gear Sectional Committee ETD-08

23.	Sumbul Munshi Joint Director STDS-CPRI, Bhopal	Member	BIS Committee on Low Voltage Switchgear & Control gear ETD - 07
24.	N. Rajkumar Joint Director CPRI, Bengaluru	Principal Member	BIS Safety of Machinery Sectional Committee (ETD- 44)
		Alternate Member	BIS Lamps and related equipment Sectional Committee (ETD- 23)
			BIS Solar Photo-voltaic energy Sectional Committee (ETD -28)
			BIS Solar Pumps Sectional Committee
		Life Member	Solar Energy Society of India (SESI)
			Society of Energy Engineers and Managers (SEEM)
		Accredited "Energy Auditor and Energy Manager"	Bureau of Energy Efficiency, Ministry of Power, Govt. of India
		Member	Prototype Committee of NIWE, Chennai
		Expert member	Excellence Enhancement Centre for Indian Power Sector (An Indo German Energy Co-operation), CEA, New Delhi
25.	Yugal Agrawal, Joint Director STDS-CPRI, Bhopal	Member	BIS Sectional Committee ETD - 47 Electrical Traction Equipments
26.	G. Girija Joint Director CPRI, Bengaluru	Member	BIS Sectional Committee for Environmental Testing Procedures – LITD 01
27.	Dr. P. Chandrasekhar Joint Director CPRI, Bengaluru	Member	National Mission on Power Electronics Technology (NaMPET)
			Bureau of Energy Efficiency (BEE), S&L Program of Refrigerator & AC
28.	Dr.M G Anandakumar Joint Director CPRI, Bengaluru	Life Member	Indian Society of Systems for Science and Engineering, Bangalore chapter(ISSS)
			Indian Ceramic Society- Bangalore chapter/Kolkata
			Indian Society of Analytical Scientists-Bangalore chapter
		Member	Metallurgical Engineers Association-Department of MME, NITK, Surathkal

			Indian Institute of Ceramics, Kolkata (MIICer)
29.	T. Mallikharjuna Rao, Joint Director CPRI, Bengaluru	Member	Indian Society of Non-Destructive Testing.
30.	M. Venkateswara Rao, Joint Director CPRI, Bengaluru	Member	Indian Society of Non-Destructive Testing (ISNT)
31.	Dr. R.K. Kumar Joint Director CPRI, Bengaluru	Life Time Member	Institute of Engineers, Kolkata.
32.	SaritaDongre Joint Director STDS-CPRI, Bhopal	Member	The Institution of Engineers (India), Kolkata
33.	K. Devender Rao Joint Director UHVRL - Hyderabad	Member	CIGRE, India
34.	K.A. Aravind Joint Director UHVRL - Hyderabad	Alternate member	Bureau of Indian Standards (BIS) ETD-19 - High voltage engineering
35.	D.M. Gourkhede Joint Director TRC – CPRI, Koradi	Member	Indian Society for Non-Destructive Testing (ISNT)
36.	Rajesh Ranjan Joint Director TRC – CPRI, Koradi	Life Member	Indian Society for Technical Education (ISTE)
		Member	Indian Society for Non - Destructive Testing (ISNT)
37.	Dr. S.K. Nath Joint Director TRC – CPRI, Koradi	Fellow	Institution of Engineers (India)
		Member	American Society of Mechanical Engineers (ASME)
		Life Member	Indian Society for Non-Destructive Testing (ISNT)
		Executive Body Member	ISNT – Nagpur Chapter
		Alternate Member	Technical Committee on Thermal Research of Standing Committee on R&D (SCRD) of Min. of Power, Govt. of India
		Supervisor for PhD	RashtrasantTukadojiMaharaj Nagpur University (RTMNU) and Visvesraya Technological University, Belagavi

38.	Saumitra Pathak Engg. Officer Gr.4 STDS-CPRI, Bhopal	Life Member	Indian Society for Technical Education
39.	U.S. Joshi Engg. Officer Gr.4 TRC-CPRI, Koradi	Member	American Concrete Institute
		Life Member	Indian Society for Non-Destructive Testing (ISNT)
40.	G. Kishore Kumar Engg. Officer Gr.4 CPRI, Bengaluru	Life Associate Member	Indian Institute of Chemical Engineers, Kolkata.
		Life Time Member	Indian Society of Analytical Scientists, Mumbai.
		Executive Member	Bangalore Regional Center of IIChE.
		Member	Clay and Stabilized soil products for construction, CED -30 of BIS
			MTD-4, BIS - Flat Steel Products Subcommittee, MTD 4.3
41.	Pradish M Engg. Officer Gr.4 CPRI, Bengaluru	Corporate Member	UCA, IUG, USA
		Member	IEC - TC 57 / WG 10: Power system IED communication and associated data models
			IEC - TC 57 / WG 21: Interfaces and protocol profiles relevant to systems connected to the electrical grid
			BIS LITD 10 Power System Control and Associated Communications
			BIS LITD 10 Panel 3 - Common Information Model
			BIS ETD13 Equipment for Electrical Energy Measurement & Load Control
			ISGF-WG 2: IoT, Smart Metering, AI and Analytics
			ISGF WG3: Digital Architecture and Cyber Security
42.	Thirumurthy Engg. Officer Gr.4 CPRI, Bengaluru	Alternate Member	BIS ETD - 09 Power Cables Committee
43.	Rajendra Singh Engg. Officer Gr.4 STDS-CPRI, Bhopal	Life Member	Metrology society of India, NPL, New Delhi
			Society of energy engineers & manager, SEEM, Thiruvananthapuram

		Member	IEI, Kolkata
44.	SukumarPeta Engg. Officer Gr.4 STDS-CPRI, Bhopal	Member	IEI, Kolkata
45.	PriyamvadaChandel Engg. Officer Gr.4 STDS-CPRI, Bhopal	Life Member	ISTE
		Member	IEI, Kolkata
46.	VijiBharathi Engg. Officer Gr.4 CPRI, Bengaluru	Official Member	DLMS UA, Switzerland
		Member (I-Alternate)	BIS ETD 13: Sectional Committee on "Equipment for Electrical Energy Measurement & Load Control"
		Member	BIS ETD13 Panel 1: IS 15959 series maintenance
			IEC TC 13/WG 14 - Data exchange for meter reading, tariff and load control
47.	Dr. Kuldeep Singh Rana Scientific Officer Gr.3 CPRI, Bengaluru	Principal Member	ETD- 10 & 11, BIS
		Member	ETD-51
			Technical Paper Review Committee of CPRI
			S&L program for Advanced Chemistry Cell (ACC) & Batteries for electric vehicle, BEE
48.	DharmeshYelamanchi Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	Sectional Committee, ETD-06, BIS
			Sectional Committee, ETD-19, BIS
49.	Dr. Manohar Singh, Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	ETD 35 Power Systems relaying Committee
			ETD 42 Wind Turbines Sectional Committee

50.	V. Vaidhyanathan Engg. Officer Gr.3 CPRI, Bengaluru	Principal Member	Power Capacitors Sectional Committee ETD-29 of BIS
		Member	MT-21 "Shunt capacitors for voltages upto and including 1000V for power systems" under IEC/TC 33
			MT – 24, "AC motor capacitors" under IEC/TC 33
			MT-19 "Shunt capacitors for voltages above 1000V for power systems" under IEC/TC 33
51.	Shaileshwari M U Engg. Officer Gr.3 CPRI, Bengaluru	Member	BIS LITD-10, Panel - 2 on security
52.	D Venkatesh Engg. Officer Gr.3 CPRI, Bengaluru	Principal Member	ETD-32, BIS
53.	RajaramMohanraoChennu Engg. Officer Gr.3 CPRI, Bengaluru	Member	ETD-16 - BIS
54.	Dilip Kumar Puhan Engg. Officer Gr.3 CPRI, Bengaluruf	Member	Standardization of the Management of Assets in Power Network Sectional Committee, ETD-53, BIS
55.	Dr. MoumitaNaskar Scientific Officer Gr.3 Engg. Officer Gr.3 CPRI, Bengaluru	Member	Winding wires Sectional Committee, ETD- 33
56.	Ramesh Patil Engg. Officer Gr.3 CPRI, Bengaluru	Member	Bureau of Indian Standards (BIS) Under LITD 10 Group Adoption CIM for Indian Utility
57.	SurendraKalambe Engg. Officer Gr.3 STDS-CPRI, Bhopal	Member	IEI, Kolkata
			Indian Society for Heating Refrigeration and Air conditioning, ISHRE, New Delhi
			Indian society for Non-Destructive testing, ISNT Chennai
58.	Mridula Jain Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	Equipment for Electrical Energy Measurement Tariff and load control Sectional Committee , ETD-13, Bureau of Indian standard, New Delhi
59.	K. Vijaya Kumar Engg. Officer Gr.3 CPRI, Bengaluru		Standing Committee of experts to Investigate Cause of failure of towers, Central Electricity Authority (CEA), New Delhi

		Alternate Member	Use of Structural Steel in Overhead Transmission Line Tower and switch yard Structures, BIS Committee CED7
			Committee for Audit of Transmission line tower with respect to design & life of towers, Central Electricity Authority CEA/CEID, New Delhi.
60.	JithinPauly P Engg. Officer Gr.2 CPRI, Bengaluru	Member	IEC TC 37 MT4
			IEC TC 37 PT 60099-11
		Alternate Member	Sectional Committee ETD-30, BIS
			Sectional Committee, ETD-48, BIS
61.	K. Marimuthu Engg. Officer Gr. 1 CPRI, Bengaluru	Associate Member	The Insulation of Engineers (India), Kolkata
62.	Ashitha P N Engg. Officer Gr. 1 CPRI, Bengaluru	Principal Member	Solid Electrical Insulating Materials and Insulation Systems Sectional Committee, ETD-02
63.	K Jeykishan Kumar Engg. Officer Gr.1 CPRI, Bengaluru	Permanent Member	International Journal of Development and Sustainability (IJDS)
			International Association of Engineers (IAENG)
			International Association of Innovation Professionals (IAOIP)
		Life time Member	Institute for Engineering Research and Publication (IFERP)
		Member	SIRFN DER Test Protocol Working Group (WG)

Appendix – 10

Papers presented / published indicating Event / Venue / Journal for 2020-21

Capacitors Division

1. Dr.T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam and A. Sheik Mohamed, titled "In-situ on-line acoustic emission measurement and off-line recovery voltage measurement for Periodic condition monitoring of oil- filled 220kV transformers-Comparison of results", at International On-line Conference IEEE-POWERCON-2020, Organized by IEEE-PES society Bengaluru, from 14th to 16th September 2020

2. V. Vaidhyanathan, Dr.T. Bhavani Shanker, R. Shyam and A. Sheik Mohamed, titled "Study of Thermal Behavior of Components integrated in Low Voltage Power Factor Correction Panels", at National Conference on "High Voltage Engineering and Technology", organized by UHVRL, CPRI, Hyderabad, on 12th March 2021

3. Dr.T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam, A. Sheik Mohamed, titled "Evaluating the Performance of Hybrid Ultra Capacitor(HUC) in a 1.5kW Solar Powered Microgrid with Hybrid Energy Storage System(HESS)", in Power Research (A Journal of CPRI), July-Dec. 2020

Cables & Diagnostics Division

4. R. Arunjothi, P. V. Satheesh Kumar, K. P. Meena, titled, "Heat and Fire Properties of Low Smoke Zero Halogen Materials of Power Cables", at 10th International Advances in Applied Physics & Materials Science Congress & Exhibition, held at Turkey, ACTA MATERIALIA TURCICA, Book of Abstracts, Page 17, APMAS 2020, (Virtual), from 14th to 20th October, 2020

5. Moumita Naskar, Dharmendra H M, Gaurav L Sarode, titled "Investigation and Analysis of the Insulation Properties of Covered Conductor", at 11th International Virtual Conference on Materials Manufacturing and Characterization (11th ICMPC), held at IIT- Indore, from 15th to 17th December 2020.

6. Ashitha P. N, Akhil. S, Gaurav L. S, Meena K. P, titled "Influence of non-ionic surfactant on electrical and hydrophobic properties of binary composites of silicone rubber" published at 11th International Virtual Conference on Materials Manufacturing and Characterization (11th ICMPC), held at IIT- Indore, from 15th to 17th December 2020.

7. Moumita Naskar, Dharmendra H M, Meena K P, titled, "Effect of nano Zinc Oxide on the electrical, thermal, mechanical and optical properties of Ethylene Vinyl Acetate co-polymer", at International Virtual Conference on Advancements in Polymeric Materials, APM 2021, held at CIPET, Bhubaneswar, from 9th to 13th March 2021.

8. P. N. Ashitha, L. S. Gaurav, K. P. Meena, titled "Development and analysis of Nano Alumina Filled Silicone Rubber Elastomers for High Voltage Insulation", at International Virtual Conference on Advancements in Polymeric Materials, APM 2021, held at CIPET, Bhubaneswar, from 9th to 13th March 2021.

9. Moumita Naskar, Dharmendra H.M, titled "Preparation and Properties of Nano Zinc-Oxide doped Ethylene Vinyl Acetate (EVA) nanocomposites for solar cell encapsulation", in Journal of "Materials Today: Proceedings" (Elsevier Publication), on May 27, 2020.

10. Arunjothi R, Thirumurthy, Dillip Kumar Puhan, Rajat Sharma, Meena K P, titled "Online partial discharge measurement on power cable system by HFCT ", at National Virtual Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021

11. Moumita Naskar, Dharmendra H M, Meena K P, titled "Thermal lifetime estimation of EVA Encapsulants from activation energy based method", at National Virtual Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021

12. Ashitha P. N, Gaurav L. S., Meena K. P, titled "Study on electrical insulation and dielectric properties of heat shrinkable components", at National Virtual Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021

13. Dillip Kumar Puhan, Rajat Sharma, Thirumurthy and K. P. Meena, titled "Field Testing and Condition Assessment of MV Power Cable System by Very Low Frequency (VLF) ac Testing", in Power Research (A Journal of CPRI), Vol. No. 16(2)/ 187-192, July-December 2020.

Dielectric Materials Division

14. Dr. P. Thomas, titled "AC Breakdown Voltage and Thermal Conductivity Behaviour of Mineral Oil based Ba 0.85Ca0.15Zr0.1Ti0.9O3 (BCZT) Nanofluids", in International Journal of Engineering Research & Technology ("IJERT"), Vol. No.10, Issue No.2, February 2021

15. G.R. Viswanath, titled "Effect of Irgamet 39 on Electrostatic charging tendency of Transformer oil", at National Conference on High Voltage Engineering & Technology (NCHVET-2021), organized by at UHRVL, CPRI, Hyderabad, on 12th March 2021.

Electrical Appliances Technology Division

16. Kuldeep Rana, S. Katari J., R. Sneha and K. U. Vinayaka, titled "A Concise review of different standards for performance testing of Lithium-ion Batteries for Electric Vehicle applications", 2020 IEEE Explore 2020, pp. 1-6, doi: 10.1109/POWERCON48463.2020.9230560

17. Shivangi Kosta, R. Sneha, Kuldeep Rana, titled “Fabrication and Electrochemical Performance of Low-Cost Soluble Lead Redox Flow Battery Using Two Different Carbon Electrodes”, 2020, pp 133-145, DOI: 10.1007/978-981-15-6394-2-16

Earthquake Engineering & Vibration Research Centre

18. R. Panneer Selvam & Yamini Gupta, titled “Seismic Qualification of Safety-related Electrical Equipment in Nuclear Power Plant”, in the CPRI Journal, Vol. No. 16, Issue No.1, January - June 2020

Energy Efficiency & Renewable Energy Division

19. Jeykishan Kumar K, R Sudhir Kumar, and V.S. Nandakumar, titled “Voltage and frequency response of three phase grid tie solar inverter during LVRT", at International online Conference on Smart Technologies in Computing, Electrical and Electronics (ICSTCEE 2020), organized by M/s. REVA University, Bengaluru, on 9th & 10th October, 2020.

20. Jeykishan Kumar K, and Sudhir Kumar R, titled "Voltage Flicker from Warm and Cool White LED Bulbs", at International online Conference "2020 IEEE PES Innovative Smart Grid Technologies Europe (ISGT-Europe)", organized by IEEE Power & Energy Society (PES) and Delft University of Technology, Delft, The Netherlands, from 26th to 28th October, 2020.

21. Jeykishan Kumar K, and R. Sudhir Kumar, titled "Surge immunity protection in AC LED street lights", at ‘2020 IEEE International online Conference for Innovation in Technology (INOCON 2020)’, organized by M/s. Nagarjuna College of Engineering and Technology, Bengaluru and technically co-sponsored by IEEE, Bengaluru Section, from 6th to 8th November 2020.

22. Jeykishan Kumar K, titled "Grid loss protection in a utility interactive single phase micro string solar inverter", in Asian Journal for Convergence in Technology (AJCT)", Volume No.6, Issue No.3, Page No.48-54, December 2020.

23. Nayeem Ninad, Estefan Apablaza-Arancibia, Michel Bui, Jay Johnson, Sigifredo Gonzalez, Rachid Darbali-Zamora, Changhee Cho, Wanbin Son, Jun Hashimoto, Kenji Ot ani, Roland Bründlinger, Ron Ablinger, Christian Messner, Christian Seit l, Zoran Miletic, Iñigo Vidaurrazaga Temez, Juan Mont oya, Franz Baumgartner, Carigiet Fabian, Sudhir Kumar, Jeykishan Kumar, Bob Fox, Ron Brandl and Russell Conklin, titled "PV Inverter Grid Support Function Assessment using Open-Source IEEE P1547.1 Test Package", at International online Conference 47th IEEE Photovoltaic Specialists Conference (PVSC 47), organized by IEEE-PVSC Technical Programme Committee, from 15th July to 21st August 2020.

24. K. Jeykishan Kumar, titled “Significance of Low Voltage Ride Through (LVRT) in solar inverters”, in Electrical India Magazine, May 2020

25. K. Jeykishan Kumar and R. Sudhir Kumar, titled “Testing standards on optical hazards of LED luminaire on human beings for India-A review”, in Power Research-A Journal of CPRI, Vol No.16, Issue No. 2, Page No. 143-152, July-December 2020.

26. S. Jothibasu, R. Sudhir Kumar and V.S. Nandakumar, titled “Development of a Novel Method for Maintaining Constant Total Head during Solar Surface Pump Testing”, in Power Research-A Journal of CPRI, Vol No.16, Issue No. 2, Page No. 125-128, July-December 2020.

27. K. Jeykishan Kumar, G. Bharath Kumar and R. Sudhir Kumar, titled "Photometric assessment of warm and cool white LED bulbs", in the Journal of Optics, Vol. No.49, Issue No.3, Page No.476-484, August 2020.

High Voltage Division

28. Jithin Pauly P, C. Prabhakar and G. Pandian, titled “Simulation and Experimental Generation of 2/20 microseconds current impulse”, at National Virtual Conference on High Voltage Engineering and Technology (NCHVET 2021), organized by UHVRL, CPRI, Hyderabad, on 12th March 2021.

29. Shyam Agarwal, G Gobinath, V Mohan Babu, C. Prabhakar and G.Pandian, titled “Pollution Performance of Various Insulator”, National Virtual Conference on High Voltage Engineering and Technology (NCHVET 2021), organized by UHVRL, CPRI, Hyderabad, on 12th March 2021.

30. K.Marimuthu, Y.Dharmesh, C.Prabhakar and G. Pandian, titled "Study of Voltage Distribution of Glass Insulator String with Defective Insulator" National Virtual Conference on High Voltage Engineering and Technology (NCHVET 2021), organized by UHVRL, CPRI, Hyderabad, on 12th March 2021

High Power Laboratory

31. Sreeram, co-authored by S. Sudhakara Reddy, Gurudev T, Maroti and Rajkumar.titled “Investigation into the correlation of SFRA numerical indices and short circuit reactance measurements of transformers”, at 2nd International Conference (Virtual Mode) on Machine Learning, Advances in Computing, Renewable Energy and Communication (MARC 2020), organised by SPRINGER at New Delhi, on 17th & 18th December, 2020.

32. Sreeram V, titled “Objective interpretation of SFRA, in the light of CIGRE TB 812”, at National Conference on High Voltage Engineering and Technology (NCHVET 2021), organised by UHVRL, CPRI, Hyderabad, on 12th March 2021.

33. Chandrasekar, titled "Wind turbine transformer technologies in Modern wind farms – A review", at National Conference on High Voltage Engineering and Technology (NCHVET- 2021) organised by UHVRL, CPRI, Hyderabad, on 12th March 2021

34. Rajaramamohanarao Chennu, titled "Study on short circuit testing of surge arresters", at National Conference on High Voltage Engineering and Technology (NCHVET 2021) organised by UHVRL, CPRI, Hyderabad, on 12th March 2021

Materials Technology Division

35. M. Venkateswara Rao, titled "Health Assessment & Remaining Life Assessment of High Pressure Critical Piping in Thermal Power Plants", at National Virtual Conference on "Pipeline Inspection & Corrosion Control", Organized by M/s. Institute of Asset Integrity & Reliability Management, on 26th June 2020

36. M. Venkateswara Rao, titled "Advanced NDE Methods for Condition Assessment & Performance Improvement of Boiler Tubes", at National Virtual Conference on "NDT & Inspection Techniques for Plant Maintenance" organized by M/s. Institute of Asset Integrity & Reliability Management", on 11th August 2020

37. M. Janardhana, titled "Scanning Boiler water wall tubes using advanced NDT method", at National Virtual Conference on "NDT & Inspection Techniques for Plant Maintenance", organized by M/s. Institute of Asset Integrity & Reliability Management, on 11th August 2020

38. M. Venkateswara Rao, titled "Strategic RBI approach for preventing forced outages in New & Old Thermal Power Plants", at National Virtual Conference on "Implementation of Risk Based Inspection & Preventive Maintenance" organized by M/s. Institute of Asset Integrity & Reliability Management, New Delhi, on 15th September 2020

39. M. Venkateswara Rao, titled "Remaining life assessment methodologies for high temperature components in Thermal Power Plant Boilers", at National Virtual Conference on "Asset Integrity Management & Inspection Summit: NDT & Inspection Techniques" Organized by M/s. Eventagious Conference & Exhibition (ConEx), New Delhi, on 5th & 6th October 2020

40. G. Kishore Kumar & M. Janaradhana, titled "Corrosion Inspection of Penstock Rivet Joints using optical laser 3D scan", at National Virtual conference on "NDE & Inspection Technology – Application & New Developments, organized by M/s. Institute of Asset Integrity & Reliability Management, New Delhi, on 9th October 2020

41. M. Venkateswara Rao, titled "Failure Analysis of Stainless steel Re-Heater tube in a 500MW Boiler and inspection methods for prevention of failures", at National Virtual Conference on "Asset Integrity Management & NDE / Inspection Technology" Organized by M/s. Institute of Asset Integrity & Reliability Management, New Delhi, on 10th October 2020

42. R.K.Kumar and M.Janardhana, titled “Remaining Life estimation of turbine generator shafts hydro plant through PAUT and Fatigue crack growth rate studies”, at National Virtual Conference on "Asset Integrity Management & NDE / Inspection Technology" Organized by M/s. Institute of Asset Integrity & Reliability Management, New Delhi on 10th October 2020

43. G. Kishore Kumar, titled “Plant Maintenance and Inspection of Lubricants in Agro-Chemical Industry”, at Virtual Conference on "Technology, Development & Sustainability in Fertilizer & Agro Chemical Industry”, held on 5th & 6th November 2020

44. M. Venkateswara Rao, titled “Corrosion Damage in Boilers & NDT Methods for its Prevention”, at National Virtual Summit on "All About Corrosion" organized by M/s. Eventagious Conference & Exhibition (ConEx), New Delhi, on 27th November 2020

45. G. Kishore Kumar & M. Janaradhana, titled "CP139" entitled "Penstock Corrosion Investigation by Laser Scan and Case studies”, at NDE 2020, Virtual Conference and Exhibition on Non - Destructive Evaluation at Bengaluru, organized by Indian society for non-destructive testing, Chennai, from 10th to 12th December 2020

46. G. Kishore Kumar & M. Janaradhana, titled “CP60” entitled "Evaluation of Electrical Steels by different Non Destructive Tests”, at NDE 2020, Virtual Conference and Exhibition on Non - Destructive Evaluation, held at Bengaluru, organized by Indian society for non-destructive testing, Chennai, from 10th to 12th December 2020

47. Dr. V. Saravanan & M. Janardhana, titled “Challenges of Co-firing of Biomass with Coal in Large Scale Pulverised Coal Boilers”, at International Virtual Conference on New Frontier in Energy, Engineering and Science (NFEES – 2021), Arya College of Engineering and IT, Jaipur, on 19th & 20th March 2021.

Metering and Utility Automation Division

48. Pradish M & Amit Jain, titled “Conformance Testing for IEC 61850 Communication Protocol of Intelligent Electronic Devices” was published in Power Research – A CPRI Journal, ISSN (Print): 0973-0338, Issue 16; Vol. 1, DOI: 10.33686/ pwj.v16i1.153171, Pg. 67-72, June 2020.

49. V. Suresh, & coauthored by P V Harinath Babu, titled “Testing Smart Meter Part – I & II” in Electrical India, Vol 60 No. 10 & 11, October & November 2020 issue.

Power System Division

50. J. Sreedevi, Chethan G N, Paila Lakshmana Rao, titled "Voltage stability analysis of IEEE 118 bus system with wind penetration", at National Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021
51. Ved Prakash Yadav, Jaiganesh.R J. Sreedevi, R.S.Shivakumara Aradhya, titled "Analysis of switching over voltages for short and medium length EHV lines", at National Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021

52. Athira Unni & Manohar Singh, titled "An Empirical Relationship for Capacitor Bank Requirement for Distribution Utilities," in Power Research Journal, December 2020.
53. Janmejaya Pradhan & Manohar Singh, titled "Modified distance relaying blocking scheme for low inertia systems", at the 21st National Power Systems Conference (NPSC 2020), held at IIT, Gandhinagar, from 17th to 19th December 2020

54. P. Kaliappan, K.S.Meera, M.P.Selvan, titled "Assessment of compliance of phasor measurement units (PMUs) for Smart Grid applications", in International Transactions on Electrical Energy Systems", Wiley Publication on 2nd March 2021, https://doi.org/10.1002/2050-7038.12835

55. Feba Alias & Manohar Singh, titled "Damping Sensitivity Analysis and Optimized BESS Controller for Small-Signal Stability Enhancement in Wind Penetrated Networks", in Sustainable Energy, Grids and Networks (SEGAN) Elsevier Volume 26, pp.1004-41, June 2021 (already published online and available on web since January 2021).

56. Feba Alias & Manohar Singh, titled "Small Signal Stability Enhancement using WDSR in RG Power Networks", at International conference - IEEE PES Innovative Smart Grid Technologies Europe (ISGT-Europe), held at Hage-Netherland, from 26th to 28th October 2020. (2020. 10.1109/ISGT-Europe47291.2020.9248782)

Mechanical Engineering Division

57. M. Selvaraj, K. Vijaya Kumar, V.K Shukla, titled "Failure Analysis of Cruciform-Leg Transmission Line Tower", in "International Journal of Steel Structures", Vol. No.21, Issue No.02, page no. 539-548, January 2021

Research & Development Management Division

58. S. Dharani Priya, A. Immanuel Selvakumar, A. Samson Nesaraj titled "Overview on Ceramic and Nanostructured Materials for Solid Oxide Fuel Cells (SOFCs)

Working at Different Temperatures" in Journal of Electrochemical Science and Technology , April 2020, https://doi.org/10.33961/jecst.2019.00612.(IJ)

59. S. Dharani Priya, A. Samson Nesaraj, A. Immanuel Selvakumar titled "Facile soft chemical synthesis and physico-chemical characterization of ceria based novel ceramic nanocomposite electrolyte for LTSOFC application" in Materials Research Innovations, April 2020. https://doi.org/10.1080/ 14328917. 2020. 1763021.

60. V Ashok, Anamika Yadav, titled "Fault Diagnosis Scheme for Cross-Country Faults in Dual-Circuit Line with Emphasis on High-Impedance Fault Syndrome", in IEEE Systems Journal Impact Factor 4.463, 25th May 2020.

61. S. Paladhi and A. K. Pradhan, titled "Adaptive distance protection for lines connecting converter-interfaced renewable plants," in IEEE Journal of Emerging and Selected Topics in Power Electronics, (available in early access). https://doi.org/10.1109/JESTPE.2020.3000276, June 2020.

62. M.L. Reni, A. Samson Nesaraj, titled "Facile chemical synthesis and characterization of nanostructured nickel oxide – ceria composite anode materials for low temperature solid oxide fuel cells", in Journal of Chemical Technology and Metallurgy, 29th June 2020.

63. Gyan Ranjan Biswal, P. Mohanty, K. J. Akram, N. P. Padhy, and T. Islam, titled "Design and Fabrication of an Inexpensive Capacitive Humidity Sensor for Smart Sub-station Automation", in IEEE Sensors Journal, Vol. 20, No. 12, pp. 6215 – 6223, Jun. 2020. DOI: 10.1109/JSEN.2020.2974522

64. S. Paladhi, A. K. Pradhan, titled "Adaptive Fault Type Classification for Transmission Network Connecting Converter-Interfaced Renewable Plants", in IEEE Systems Journal, DOI: 10.1109/JSYST.2020.3010343, July 2020.

65. Mullukattil Lukose Reni, A. Samson Nesaraj, titled "Preparative methods and recent technological applications of ceria based nanostructured catalyst materials in chemical and other fields – a review", in Materials Research Innovations, 15th July 2020.

66. Hadhiq Khan, Mohammad Abid Bazaz, Shahkar Ahmad Nahvi, titled "Adaptive multi-resolution framework for fast simulation of power electronic circuits", in IET Circuits, Devices & Systems, no. 4, vol 14, pp. 537-546 July, 2020

67. Merin Pulikkottil, Jimmy Joy P, M N Muralidharan, Seema A, titled "Biomass derived activated carbon and its suitability for high-performance supercapacitor electrode applications", at International Conference on green energy for environmental sustainability (ICGEES-2020), NIT Calicut, 5th - 6th August 2020.

68. P. Naveen and P. Jena, titled "Directional Overcurrent Relays Coordination Scheme for Protection of Microgrid", at First IEEE International Conference on Smart Technologies for Power, Energy and Control (STPEC), Nagpur, 25th to 26th September 2020

69. S. Raghu, Karthik D., Thanga Raj Chelliah, titled "Fault Diagnosis and Tolerant Operation of Multi-Channel 3L-NPC Power Converter Fed Adjustable Speed Hydro-Generating Unit", at 55th IEEE IAS Annual Meeting (USA), held at Detroit, Michigan, USA, from 10th to 16th October 2020.

70. Sandeep Kumar, Subodh Khullar, Michel J. Cervantes and Bhupendra K. Gandhi, titled "Shear Layer and Vortex identification of Rotating Vortex Rope Structure Obtained via Proper Orthogonal Decomposition", in the Proceedings of the 8th International and 47th National Conference on Fluid Mechanics and Fluid Power (FMFP), IIT Guwahati, 9th to 11th December 2020.

71. Gourav Kumar Ghosh and Chandan Kumar, titled "Improved Power Sharing and Voltage Regulation with Modified Droop Control in Microgrid", at National Power Systems Conference (NPSC), IIT Gandhinagar, 17th to 19th December 2020.

72. Devendra Kumar, Dwijasish Das, Chandan Kumar, titled "Multifunctional Model Predictive Control of Grid Connected Voltage Source Converter", at 9th IEEE International Conference on Power Electronics, Drives and Energy systems (PEDES), MNIT Jaipur, 16th & 17th December 2020.

RTL – Noida

73. Neha Adhikari, titled "Analysis of Partial Discharge Measurements on Medium Voltage Covered Conductor for Overhead Transmission Lines", at 12th International Symposium on Advanced Topics in Electrical Engineering, Bucharest, Romania, from 25th to 27th March 2021

74. Neha Adhikari, titled "Insulation Condition Monitoring in High Voltage Power Cables using Partial Discharge Measurements", at 12th International Symposium on Advanced Topics in Electrical Engineering, Bucharest, Romania, from 25th to 27th March 2021

RTL - Kolkata

75. Dr. P.K Maiti**,** Manas Chakraborty, Manish Kumar and M. Siddhardha, titled "Power Transformer Fault Severity Based on Trend Analysis of Dissolved Gases in Liquid Insulator", at National Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI Hyderabad, on 12th March 2021.

RTL - Guwahati

76. Niharika Baruah, Rohith Sangineni, Manas Chakraborty, Sisir Kumar Nayak titled "Statistical Analysis of Natural Ester based Insulating Liquid using Hypothesis Testing", at 9th IEEE International Symposium on Electrical Insulating Materials (ISEIM), held at Tokyo, Japan, from 13th to 17th September, 2020.

77. Manas Chakraborty, Niharika Baruah, Rohith Sangineni, Sisir Kumar Nayak & Prabhat Kumar Maiti, titled "Dissolved Gas Analysis (DGA) of thermally aged blended transformer oil", at IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP) 2020, held through video conference from 18th to 28th October 2020

78. Niharika Baruah, Rohith Sangineni, Manas Chakraborty & Sisir Kumar Nayak, titled "Data Driven Analysis of Aged Insulating Oils by UV-Vis pectroscopy and Principal Component Analysis (PCA)", at IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP) 2020, held through video conference from 18th to 28th October 2020.

79. Rohith Sangineni, Niharika Baruah, Manas Chakraborty & Sisir Kumar Nayak, titled "Effect of magnetic properties of liquid dielectric on the leakage flux of power transformer", at IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP) 2020, held through video conference, from 18th to 28th October 2020.

Short Circuit Laboratory

80. M. Rama Narayana Reddy and co-authored by Shri Jarupula Somlal, Shri Pakkiraiah. B & Shri. S. Arjuna Rao, titled "Design of Optimal Integrator Control Algorithm for Single- Stage GRID Connected Solar Array System", in the International Conference on Sustainable Energy and Future Electric Transportation (SeFeT-2021) organized by GRIET in association with IEEE, Hyderabad, from 21st to 23rd January 2021. The Technical paper submitted, was scheduled in Technical Session 07- with Paper ID:76

81. M. Rama Narayana Reddy and co- authored by Shri Jarupula Somlal & Shri. S. Arjuna Rao, titled "Design of Fractional Order PID and Proportional Resonant Controller for Enhancement of Voltage Regulation in Multi-Bus Micro grid System", in "Journal of Green Engineering (JGE)", Volume -10, Issue-9, September 2020 issue, Page Nos. 5421-5436.

Switchgear Testing & Development Station, Bhopal

82. B.A. Sawale, titled "Status of IS and IEC metering standards" in Webinar on "Smart Meters: IS 16444 and IS 15959-Testing & Case Studies", held at STDS, CPRI, Bhopal, on 9th March 2021.

83. Sukumar Peta, titled "Testing of Smart Meters as per IS 15959(Part 2): 2016" in Webinar on "Smart Meters: IS 16444 and IS 15959-Testing & Case Studies", held at STDS, CPRI, Bhopal, on 9th March 2021.

84. Diptiranjan Sahoo Yugal Agrawal, Manoher Singh Takkher, M.K. Wadhwani, titled "Variation in stray losses of transformers – A CPRI experience", in Webinar on "Emerging Trends and Challenges in Transformer Design, Testing and Maintenance", held at STDS, CPRI Bhopal, on 17th March 2021.

85. G. Venkateswarlu, Yugal Agrawal, Manoher Singh Takkher, M.K. Wadhwani, titled "Impact of short circuit test on distribution transformer of rating above 1250kVA", in Webinar on "Emerging Trends and Challenges in Transformer Design, Testing and Maintenance", held at STDS, CPRI, Bhopal, on 17th March 2021.

86. M.K. Wadhwani, Sumbul Munshi, Himangshu Roy, Saumitra Pathak, Prabakaran T titled "Case study- Dielectric failure of distribution transformer", at National Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021.

87. M.A. Ansari, Leena H Roy, Manoj Hirani, titled "Analysis of Beta- Factor in Lightning Impulse Voltage by introduction of Damping Resistor in the Circuit", at National Conference on High Voltage Engineering and Technology (NCHVET 2021), held at UHVRL, CPRI, Hyderabad, on 12th March 2021.

88. Leena H Roy, titled "Testing of Instrument Transformers as per the National and International Standard", in Webinar on "Testing and Evaluation of Instrument Transformer", held at STDS, CPRI, Bhopal, on 4th March 2021.

89. G. Ravi, titled "Practical Aspects of Conventional CTs and Rogowski Coil" in Webinar on "Testing and Evaluation of Instrument Transformer", held at STDS, CPRI, Bhopal, on 4th March 2021.

90. Abhishek Verma, titled "Testing and Development of Residual Voltage Transformer" in Webinar on "Testing and Evaluation of Instrument Transformer", held at STDS, CPRI, Bhopal, on 4th March 2021.

Training Division

91. M.G. Anandakumar and G. Kishore Kumar, titled "A study on various Biomass samples for slagging propensity and effective use as fuel", in the International Conference on New Frontier in Energy, Engineering & Science (NFEES – 2021), organized by Arya College of Engineering and I.T., ACEIT, Jaipur, through online mode, on 19th & 20th March, 2021.

Thermal Research Centre, Koradi

92. S. K. Nath, titled "Estimates of Probability of Detection and Sizing of Flaws in Ultrasonic Time of Flight Diffraction Inspections for Complex Geometry Components With Grooved Surfaces", in Journal of Non-destructive Evaluation, Diagnostics and Prognostics of Engineering Systems of American Society of Mechanical Engineers (ASME), Published online in October 2020, doi: https://doi.org/10.1115/1.4048381

93. Uday .S. Joshi, Rajesh Ranjan, titled "Restoration of Steam Turbine Deck RCC Structure using high strength material", at International Conference on "Advancement and Innovations in Civil Engineering(IC-AICE2021), organized by KDK College of Engineering in association with American Society of Civil Engineering, Indian Society of Engineer, Indian Concrete Institute, Indian WW Association, from 18th to 20th March 2021.

94. Rajesh Ranjan, Uday .S. Joshi, titled "Structural Health Monitoring of Welded steel structure in Thermal Power Plant and process Industries", at International Conference on "Advancement and Innovations in Civil Engineering(IC-AICE2021), organized by KDK College of Engineering in association with American Society of Civil Engineering, Indian Society of Engineer, Indian Concrete Institute, Indian W W Association, from 18th to 20th March 2021.

UHVRL, Hyderabad

95. K Devender rao, G V Rao, G Ramesh, K Govardhana Chari titled "Comparison of used conductor for Corona, Radio Interference Voltage (RIV) characteristics and audible noise values with unused conductor", at "Smart Grid Energy System and Control (SESAC – 2021)", held at NIT, Kurukshetra, from 19th to 21st March 2021.

96. K A Aravind, K Urukundu, Pradeep M Nirgude titled "Study on Evaluating the protection system of Radio Communication Antenna for Naval Ships against the Direct Lightning Impulse Voltages" at "International Conference on Power Electronics and Energy", held at KIIT, Bhubaneswar, on 2nd & 3rd January 2021.

97. K Urukundu, K A Aravind, Pradeep M Nirgude, Gangeshwar Singh, K Sandhya titled "Design and analysis of overshoot compensation circuit to perform the lightning impulse voltage test on high capacitive load" at " National Conference on High Voltage Engineering & Technology – 2021 (NCHVET – 2021)", held at CPRI, Hyderabad, 12th March 2021

98. P Rajamani, K A Aravind, Pradeep M Nirgude, titled "Measurement of electric and magnetic field strengths under 765 kV UHVAC single circuit transmission line" at " National conference on High Voltage Engineering & Technology – 2021 (NCHVET – 2021)", held at CPRI, Hyderabad, on 12th March 2021.

99. P Rajamani, K A Aravind, Pradeep M Nirgude, G Ramesh, G V Rao titled "Measurement of corona power loss of bundle conductors in cage" at "National conference on High Voltage Engineering & Technology – 2021 (NCHVET – 2021)", held at CPRI, Hyderabad, on 12th March 2021.

100. K Devender rao, G V Rao, G Ramesh titled "Comparison of porcelain and glass insulator profiles during artificial pollution testing using salt fog method" at "National Conference on High Voltage Engineering & Technology – 2021 (HVET – 2021)", held at CPRI, Hyderabad, on 12th March 2021.

Appendix - 11

M.A. NARASIMHAN & CO.,
Chartered Accountants

Off. : 080-23344701 / 94483 36099, 92430 39080.
E-mail : manco@mancoca.com / mancoca@gmail.com /
manco@mancoca.in
Url : www.mancoca.com

No. 25, (Old No. 13), 1st Floor, 7th Cross, Swimming Pool Extension
Malleswaram, Bengaluru-560 003.

INDEPENDENT AUDITOR'S REPORT

To,
The Governing Council
Central Power Research Institute
Bangalore.

Report on the Financial statements

Opinion

We have audited the accompanying financial statement **of CENTRAL POWER REASEARCH INSTITUTE** ("the Institute"), which comprise the balance sheet as at March 31,2021, the Income and Expenditure Account for the year then ended of the Institute for the year thereto and a summary of significant accounting policies and other explanatory information.

In our opinion, except for the effect on the financial statements of the matters described In the basis for **Qualified Opinion** paragraph, the financial statements have been properly prepared.

a. In the case of the Balance sheet, of the state of the affairs of the Institute as at March 31,2021. And

b. In the case of the Income and Expenditure Account, of the excess of income over expenditure for the year ended as at that date.

Basis of Qualified Opinion

a) The Ministry of Power, Government of India has mandated CPRI to create a Superannuation fund to take care of the retirement and pension liabilities. The balance of the fund inclusive of current year provision of Rs.90.35 crore should have been stated at 797.79 Crore in the financials. The total fund balance in the financials is stated at 747.79 Crores as at 31-03-2021 and thereby a short provision of Rs 50 Crores . Hence the surplus for the year has been overstated and provision for Superannuation is understated to the extent of Rs 50 Crores.

We conducted our audit in accordance with the Standards on Auditing (SAs). Our responsibilities under those Standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Institute in accordance with the Code of Ethics issued by the Institute of Chartered Accountants of India together with the ethical requirements that are relevant to our audit of the financial statements and we have fulfilled our other ethical responsibilities in accordance with these requirements and the Code of Ethics. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our **Qualified opinion**.

M.A. NARASIMHAN & CO.,
Chartered Accountants

Off. : 080-23344701 / 94483 36099, 92430 39080.
E-mail : manco@mancoca.com / mancoca@gmail.com /
manco@mancoca.in
Url : www.mancoca.com

No. 25, (Old No. 13), 1st Floor, 7th Cross, Swimming Pool Extension
Malleswaram, Bengaluru-560 003.

In our opinion and to the best of our information and according to the explanations given to us, except for the effects of the matter described in the Basis for Qualified Opinion section of our report, the aforesaid financial statements give a true and fair view in conformity with the accounting principles generally accepted in India, of the state of affairs of the Institute as at March 31st, 2021 and and its excess of income over expenditure for the year ended as on that date

Emphasis of Matter

We draw attention to the following in Schedule No. 5 & Schedule No. 8 of the financial statements

EMD, Security Deposits & Others (Grouping under Current Liabilities):

a) The Institute is has to frame a policy on treatment of unclaimed Security Deposits and Earnest Money deposits. The management should make a policy based on law of limitation stating that the Security deposit and Earnest Money deposits will be refundable to the claimant if he claims only within a certain period else would be charged back as revenue. The Management cannot indefinitely continue to be a custodian for indefinite period.

b) There are unknown direct remittances of Rs 5.74 Crores which is under continuous reconciliation. We recommend the management to implement process to identify such unknown remittances in future to have better control over debtors.

Other Matters:

The Institute has maintained CPWD schedule for having completed certain civil works from 2017-18 till 2020-21. Most of works executed are progressive projects with completion period of more than 1 year. The management is yet to receive completion certificates for the said projects to the tune of Rs.47.40 Crores. In the absence of work completion certificate, we are unable to comment on any claims/contingencies/ escalations/possible progressive expenditures/billings accrued in these projects.

Our opinion is not modified in respect of this matter.

M.A. NARASIMHAN & CO.,
Chartered Accountants

Off. : 080-23344701 / 94483 36099, 92430 39080.
E-mail : manco@mancoca.com / mancoca@gmail.com / manco@mancoca.in
Url : www.mancoca.com

No. 25, (Old No. 13), 1st Floor, 7th Cross, Swimming Pool Extension
Malleswaram, Bengaluru-560 003.

Responsibility Management and those charged with Governance for the Financial statements

The Management of the Institute is responsible for the preparation of the financial statements in accordance with the generally accepted accounting principles in India. This responsibility includes the design, implementation and maintenance of internal controls relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatements, whether due to fraud or error.

Auditor's Responsibility for the audit of Financial Statement

Our responsibility is to express an opinion on these financial statements based on our audit. We have conducted our audit in accordance with the standards on auditing issued by the Institute of Chartered Accountants of India (ICAI).

Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessments of the risks of material misstatement of the financial statements whether due to fraud or error.

In making those risk assessments, the auditor considers internal controls relevant to the Institute's preparation and fair presentation of the financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the Institute's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of the accounting estimates made by the management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our qualified audit opinion of the Financial Statements.

M.A. NARASIMHAN & CO.,
Chartered Accountants

Off. : 080-23344701 / 94483 36099, 92430 39080.
E-mail : manco@mancoca.com / mancoca@gmail.com / manco@mancoca.in
Url : www.mancoca.com

No. 25, (Old No. 13), 1st Floor, 7th Cross, Swimming Pool Extension
Malleswaram, Bengaluru-560 003.

Report on other Legal and Regulatory Requirements

As required by Societies Registration Act and applicable statutes we report that:

a)) We have sought and obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit except for the information stated in "Basis of Qualification" paragraph
b) In our opinion, proper books of account as required by law have been kept by the Institute so far as it appears from our examination of those books
c) The Balance Sheet, the Statement of Income and dealt with by this Report are in agreement with the books of account

For **M.A. NARASIMHAN & CO.,**
Chartered accountants
ICAI Firm Regn. No.002347S

(M.A Parthanarayan)
Partner
Membership No: **028994**

UDIN: 21028994AAAAGR1146

Place: Bengaluru
Date:13-08-2021

CENTRAL POWER RESEARCH INSTITUE, BANGALORE.

BALANCE SHEET AS AT 31ST MARCH 2021

(Amount in Rs.)

Capital Fund and Liabilities	Schedule	Current Year	Previous Year
Capital Reserve representing Assets acquired from Grant-in-Aid from Government of India and Others	1	12,36,68,57,501	11,92,11,06,283
Reserves and Surplus	2	1,03,45,81,330	1,04,20,15,615
Earmarked and Endowment Funds	3	10,87,43,20,447	10,03,06,60,628
Grants from Government of India	4	1,33,27,85,467	97,36,20,503
Current Liabilities and Provisions	5	94,27,78,928	1,10,25,71,089
TOTAL		**26,55,13,23,673**	**25,06,99,74,117**
Assets			
Fixed Assets	6	12,06,28,57,499	11,61,71,06,282
Investments from Earmarked & Endowment Funds	7	10,07,02,71,405	9,17,24,40,462
Current Assets, Loans and Advances	8	4,41,81,94,769	4,28,04,27,373
TOTAL		**26,55,13,23,673**	**25,06,99,74,117**
Significant Accounting Policies	16		
Notes on Accounts & Contingent Liability	17		

Schedules 1 to 8 and 16 & 17 form part of Balance Sheet

As per Our Report of Even Date
for M.A. NARASIMHAN & CO.,
Chartered Accountants
FRN-002347S

Bangalore
13-08-2021

(C.S. Murali Krishna)
Chief Accounts Officer

(V.S Nandakumar)
Director General

(M.A.Partha Narayan)
Partner
Membership No. 028994

M.A. NARASIMHAN & CO. ICAI Firm Reg. No 002347S Bangalore Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2021

(Amount in Rs.)

INCOME	Schedule	Current Year	Previous Year
Income from Test Fee & Consultancy	9	127,26,24,326	146,64,67,588
Fees	10	44,03,542	1,93,46,003
Interest Earned	11	8,91,16,640	9,95,71,985
Other Income	12	12,77,27,576	1,79,43,815
TOTAL (A)		**149,38,72,084**	**160,33,29,391**
EXPENDITURE			
Research Establishment Expenses	13	95,04,98,754	94,64,95,636
Research Administrative Expenses	14	25,73,02,384	73,78,25,224
Depreciation	15	26,14,94,303	-22,57,69,040
TOTAL (B)		**146,92,95,440**	**145,85,51,821**
Balance being excess of Income over Expenditure (A-B)		2,45,76,644	14,47,77,571
Add:			
Opening Balance of General Reserve Account		14,36,25,286	2,60,76,612
Less:			
Assets directly acquired out of General Reserve		17,10,194	76,65,573
Assets (Non Plan) acquired transferred to Capital Reserve		90,97,045	1,95,63,322
CLOSING BALANCE OF GENERAL RESERVE		**15,73,94,691**	**14,36,25,289**
Significant Accounting Policies	16		
Notes on Accounts & Contingent Liability	17		

Schedules 9 to 15 and 16 & 17 form part of Income & Expenditure Account

As per Our Report of Even Date
for M.A. NARASIMHAN & CO.
Chartered Accountants
FRN-002347S

Bangalore
13-08-2021

(C.S. Murali Krishna)
Chief Accounts Officer

(V.S Nandakumar)
Director General

(M.A.Partha Narayan)
Partner
Membership No. 028994

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

	SCHEDULE - 1	Current Year		Previous Year	
	CAPITAL RESERVE REPRESENTING ASSETS ACQUIRED FROM GRANT-IN-AID FROM GOVT. OF INDIA AND INTERNAL RESOURCES				
a)	Under Non-recurring Grant-in aid	1025,64,34,961		912,93,17,842	
	Addition during the year	40,20,16,353		112,71,17,119	
			1065,84,51,314		1025,64,34,961
b)	Under Non-recurring Grant-in aid (For M/s. NHPTL Equity Capital)	24,00,00,000		24,00,00,000	
	Addition during the year	-	24,00,00,000	-	24,00,00,000
c)	Under R&D Schemes	36,51,05,673		33,28,85,096	
	Addition during the year	169,07,263	38,20,12,936	3,22,20,577	36,51,05,673
d)	Assets Acquired out of RSoP & NPP Management Fund	24,04,110		24,04,110	
	Addition during the year	1,47,173	25,51,283	-	24,04,110
	Sub Total (A)		1128,30,15,533		1086,39,44,744
	ASSETS ACQUIRED FROM INTERNAL RESOURCES				
e)	Under Non-recurring Grant-in aid (CPRI's 10% Contribn.)	25,64,20,118		17,78,73,227	
	Addition during the year	1,04,04,864		7,85,46,891	
			26,68,24,982		25,64,20,118
f)	Under Revenue	24,72,32,109		22,76,68,786	
	Addition during the year	90,97,045	25,63,29,154	1,95,63,322	24,72,32,109
g)	Under Revenue (Equity Participation)	6,40,00,000		6,40,00,000	
	Addition during the year	-	6,40,00,000	-	6,40,00,000
h)	Assets Acquired out of General Reserve	8,37,51,104		7,60,85,531	
	Addition during the year	17,10,194	8,54,61,298	76,65,573	8,37,51,104
i)	Assets Acquired out of Sponsored Schemes	35,13,50,617		25,10,18,449	
	Addition during the year	54,68,325	35,68,18,942	10,03,32,168	35,13,50,617
j)	Capitalisation of Assets acquired out of Loan		4,89,94,808		4,89,94,808
k)	Surplus on sale of Asset	54,12,783		54,12,783	
	Addition during the year	-	54,12,783	-	54,12,783
	Sub Total (B)		1,08,38,41,968		1,05,71,61,539
	TOTAL (A+B)		**12,36,68,57,501**		**11,92,11,06,283**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

	SCHEDULE 2	Current Year		Previous Year	
	RESERVES AND SURPLUS				
A	**GENERAL RESERVE**				
	As per last Account	14,36,25,286		2,60,76,612	
	Add: Surplus during the year	2,45,76,644		14,47,77,569	
	Less: Assets directly acquired out of General Reserve	17,10,194		76,65,573	
	Less: Assets (Non Plan) acquired transferred to Capital Reserve	90,97,045		1,95,63,322	
	Net Balance A		**15,73,94,691**		**14,36,25,286**
B	**Reserve for Capital Expenditure out of CPRI generated funds**				
	Opening Balance	84,55,79,882		54,71,26,773	
	Add: Provision / contribution made during the year	-		37,70,00,000	
	Less: Utilisation during the year	1,04,04,864		7,85,46,891	
	Net Balance B		**83,51,75,018**		**84,55,79,882**
C	**MAINTENANCE, RENEWAL & OBSOLESCENCE RESERVE**				
	Opening Balance	5,28,90,117		6,56,79,841	
	Add: Interest earned, Loan from HO & accrued during the year	21,54,715		39,70,634	
	Less: Utilisation during the year	1,40,87,155		167,60,358	
	Sub Total	4,09,57,677		**528,90,117**	
	Add: Security Deposit	8,97,781		6,11,843	
	Statutory Liabilities	1,56,163		(6,91,513)	
	Net Balance B		**4,20,11,621**		**5,28,10,448**
	TOTAL (A+B)		**103,45,81,330**		**104,20,15,615**

Place : Bangalore,
Date: 13-06-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

	SCHEDULE 3:	Current Year		Previous Year	
	EARMARKED & ENDOWMENT FUNDS:				
A	**SUPERANNUATION FUND**				
	Opening Balance	701,18,07,255		658,35,80,501	
	Add: Receipts from other organisations	-		-	
	Add: Contribution during the year	40,35,00,000		35,00,00,000	
	Add: Interest earned	43,50,22,214		44,26,21,889	
	Less: Utilisation for Pension payments	37,23,62,492		36,43,95,135	
	Sub Total	**747,79,66,977**		**701,18,07,255**	
	Add: Security Deposit	25,56,942		12,57,010	
	Add: Pension Payable /Others	-		-	
	Add: Medical Expenses reimburseable to CPRI	-		1,16,27,898	
	Add: Maturity Payable to CPRI	-		1,76,85,000	
	Net Balance - A		**748,05,23,919**		**704,23,77,163**
B	**PROVIDENT FUND**				
	Opening Balance	39,43,75,193		36,96,01,711	
	Add: Transfer from Other Organisation	-		-	
	Add: Subscriptions & Repayments	7,31,65,746		7,51,75,628	
	Add: Interest Paid / Credited to PF subscribers	2,45,41,327		2,78,40,573	
	Less: Final Settlement Withdrawals	7,04,72,314		4,65,13,347	
	Less: Withdrawals	3,60,65,802		3,19,28,372	
	Sub Total	**38,55,44,150**		**39,43,75,193**	
	Add: Balances under Security Deposit etc.,	79,454		958	
	Opening Balance (Additional Interest)	4,04,31,503		3,62,65,505	
	Add: Additional Interest earned (Excess of Interest Paid over Interest earned Rs.3,11,25,876-Rs.2,60,62,322)	50,63,554		41,65,997	
	Total	4,54,95,057		4,04,31,503	
	Net Balance - B		**43,11,18,661**		**43,48,07,653**
C	**NEW PENSION SCHEME FUND**				
	(I) Opening Balance (Employee's Contribution)	24,920		24,920	
	Add: Interest on Employees' Contribution (cumulative)	18,878		13,869	
	(II) Opening Balance (Employer's Contribution)	24,919		24,919	
	Add: Interest on Employer's Contribution (cumulative)	18,878		13,869	
	Sub Total	87,595		77,577	
	Add: Additional Interest earned	1,76,110		1,71,496	
	Add: Balances under Security Deposit etc.,	16,782		16,782	
	Net Balance - C		**2,80,487**		**2,65,855**
D	**DEPRECIATION FUND**				
	Opening Balance	238,73,14,630		244,94,12,137	
	Less: Revised Depreciation upto 01.04.2019	-		(48,43,57,224)	
	Add: Depreciation During the year	26,14,94,303		25,85,88,184	
	Sub Total	264,88,08,933		222,36,43,097	
	Add: Interest received	8,69,32,608		8,37,36,655	
	Add: Interest accrued	8,76,01,101		7,99,34,878	
	Less: Utilization During the year	-		-	
	Net Balance - D		**282,33,42,642**		**238,73,14,630**
E	**OTHER FUNDS**				
	(I) Sponsored Scheme Deposits		8,61,64,652		9,31,86,382
	(II) IHRD Scheme Deposits		5,28,90,086		7,27,08,945
	TOTAL (A+B+C+D+E)		**1087,43,20,447**		**1003,06,60,628**

Place: Bangalore
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

		SCHEDULE 4	Current Year		Previous Year	
		GRANTS FROM GOVT. OF INDIA, & OTHERS				
A		Under Non-recurring Grant-in aid				
		Opening Balance	91,09,08,287		25,80,25,406	
		Add: Grant received during the year	70,00,00,000		178,00,00,000	
		Less: Grant utilised during the year	40,20,16,353		112,71,17,119	
		Grant Balance		120,88,91,934		91,09,08,287
B		Under R&D Schemes Grant-in-Aid				
	(I)	Under IHRD Schemes				
		Opening Balance	4,64,22,847		7,44,30,847	
		Add: Grant received during the year	7,54,33,671		-	
		Less: Grant utilised during the year	10,79,000		2,80,08,000	
		Grant Balance		12,07,77,518		4,64,22,847
	(II)	Under RSoP Scheme				
		Opening Balance	-		70,74,626	
		Add: Grant received during the year	2,41,84,747		2,45,75,766	
		Less: Grant utilised during the year	2,41,84,747		3,12,64,347	
		Add: Unspent balance received	23,19,074		-	
		Less: Grant refunded to M o P during the year	-		3,86,045	
		Grant Balance		23,19,074		-
	(III)	Under NPP Scheme				
		Opening Balance	1,62,89,369		6,49,71,515	
		Add: Grant received during the year	-		-2,45,75,766	
		Less: Grant utilised during the year	2,37,88,370		1,43,48,380	
		Add: Unspent balance received	82,95,941			
		Less: Grant refunded to M o P during the year	-		97,58,000	
		Grant Balance		7,96,940		1,62,89,369
		TOTAL		**133,27,85,467**		**97,36,20,503**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

	SCHEDULE 5	Current Year		Previous Year	
	CURRENT LIABILITIES AND PROVISIONS				
	CURRENT LIABILITIES				
1	**Sundry Creditors**				
	a) For Supplies & Services	94,04,118		1,45,65,186	
	b) For Expenses	2,75,00,655		2,75,10,699	
	c) For Salaries	4,47,47,427		4,68,36,426	
	d) For Others	5,47,39,692		5,54,74,750	
	e) Interest received on Grant Account to be refunded to M o P	19,05,064		4,04,18,986	
			13,82,96,956		18,48,06,047
2	**Deposits Received**		67,01,79,349		73,41,46,384
3	**Statutory Liabilities**		3,93,39,666		3,60,78,154
4	**EMD, Security Deposits and others**		9,49,62,957		14,75,40,504
5	**Reserve for Doubtful debts**		-		-
	TOTAL		**94,27,78,928**		**110,25,71,089**

Place: Bangalore,

Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

	SCHEDULE 6	GROSS BLOCK						
	FIXED ASSETS	Cost/valuation As at beginning of the year	Additions during the year (Non-Plan)	Additions during the year (NC-Project)	Transfer from WIP (CPRI)	Transfer from WIP (MOP)	As at the Current year end	As at the Previous year end
A	FIXED ASSETS:							
1	LAND:							
	Freehold	6,96,84,860	-	-		-	6,96,84,860	6,96,84,860
2	BUILDINGS ON FREEHOLD LAND	119,54,57,993	17,10,194	-			119,71,68,187	119,54,57,993
3	PLANT MACHINERY & EQUIPMENT	692,20,06,269	90,19,297	1,69,07,263			694,79,32,829	692,20,06,269
4	VEHICLES	55,81,762	-	-			55,81,762	55,81,762
5	FURNITURE, FIXTURES	3,28,55,443	2,24,921	-			3,30,80,364	3,28,55,443
6	LIBRARY BOOKS & FILM	1,55,45,927	-	-		-	1,55,45,927	1,55,45,927
7	MACHINERY & EQUIPMENTS (SPONSERED PROJECTS)	35,13,50,616	54,68,325	-		-	35,68,18,941	35,13,50,616
	TOTAL (A)	**859,24,82,869**	**1,64,22,737**	**1,69,07,263**	-	-	**8,62,58,12,870**	**8,59,24,82,869**
B	CAPITAL WORK-IN-PROGRESS	287,98,03,104	40,20,16,353			-	328,18,19,457	287,98,03,104
	CAPITAL WORK-IN-PROGRESS (CPRI GRANT PORTION)	14,48,20,308	1,04,04,864		-		15,52,25,172	14,48,20,308
	TOTAL (B)	**3,02,46,23,412**	**41,24,21,217**	-	-	-	**3,43,70,44,629**	**3,02,46,23,412**
	GRAND TOTAL	**1161,71,06,282**	**42,88,43,953**	**1,69,07,263**	-	-	**1206,28,57,499**	**1161,71,06,282**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.
Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

	SCHEDULE 7	Current Year	Previous Year
	INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS		
A	**SUPERANNUATION FUND INVESTMENT ACCOUNT**		
	1 Investment in LIC of India, under Superannuation Scheme	7,03,61,31,271	661,85,26,488
	2 Claims Receivables	8,09,000	2,24,87,364
	3 Cash at Bank (S.B. Account No.10356553751)	4,00,83,648	5,13,63,312
	Total - A	**707,70,23,919**	**669,23,77,164**
B	**PROVIDENT FUND INVESTMENT ACCOUNT**		
	1 In Government Securities	3,64,92,938	3,64,92,938
	2 Bonds	27,50,00,000	26,00,00,000
	3 Term Deposits with Banks & Financial Institutions	7,96,00,000	11,50,00,000
	4 Interest Accrued on Provident Fund Investments	53,62,393	70,15,946
	5 TDS Receivables	-	70,85,366
	6 Cash at Bank (S.B. Account No.10356553740)	3,46,63,329	92,13,403
	Total - B	**43,11,18,661**	**43,48,07,653**
C	**NEW PENSION SCHEME FUND INVESTMENT ACCOUNT**		
	1 Deposit with Bank	2,80,487	2,65,854
	Total - C	**2,80,487**	**2,65,854**
D	**DEPRECIATION FUND INVESTMENT ACCOUNT**		
	1 Term Deposits with Banks & Financial Institutions	1,36,42,47,238	6,75,54,914
	2 Bonds	1,11,00,00,000	1,89,75,00,000
	3 Interest Accrued on Depreciation Fund Investments	8,76,01,101	7,99,34,878
		2,56,18,48,339	**2,04,49,89,792**
	Total (A+B+C+D)	**10,07,02,71,405**	**917,24,40,462**

Place : Bangalore
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2021

(Amount in Rs.)

		SCHEDULE 8	Current Year		Previous Year	
A		**CURRENT ASSETS, INVESTMENTS, LOANS & ADVANCES**				
		CURRENT ASSETS:				
	1	**Inventories:**				
		a) Stores and Spares		10,36,614		10,88,881
	2	**Sundry Debtors:**				
		a) Debts Outstanding for a period exceeding six months	21,69,84,914		17,43,68,319	
		b) Debts Outstanding for a period not exceeding six months	12,21,13,267	33,90,98,181	16,93,60,194	34,37,28,513
	3	**Cash balances in hand (including cheques/drafts, Imprest and Stamps)**		2,91,138		2,54,875
	4	**Deposits and Bank Balances:**				
		a) Margin Money Deposits on R&D, SPON & Revenue	35,25,000		68,85,000	
		b) Margin Money Deposits on Grant account	72,77,61,265		83,45,63,194	
		c) Deposits earmarked for Superannuation Fund	40,35,00,000		35,00,00,000	
		d) Deposits earmarked for Depreciation Fund	26,14,94,303		25,85,88,184	
		e) Interest Payable to Dep. Fund	-		8,37,36,655	
		f) Capital Bank Balance (Incl. MODs)	49,75,52,527		8,46,14,206	
		g) Savings Accounts	96,70,31,003	2,46,08,54,098	21,27,96,184	1,83,12,63,423
	5	**Deposits of Maintenance, Renewal & Obsolescence Reserve**	4,00,00,000		1,50,00,000	
		Add: Savings Bank account of Maintenance, Renewal & Obsolescence Reserve	33,15,070		4,97,746	
		Add: Maturity to be received from CPRI	-		429,84,022	
		Add: Accrued Interest on MRO Fund & TDS Receivable, etc.,	18,22,551	4,51,37,621	11,86,901	5,96,68,669
B	1	**Investments**				
		a) Investment in Shares of Joint Venture Company, M/s National High Power Test Laboratory Pvt Ltd., New Delhi	30,40,00,000		3040,00,000	
		Add: Amount paid for allotment of Additional Shares	-	30,40,00,000	-	30,40,00,000
		b) Long Term & Short Term Investments	-			
		Margin Money with Banks against BG	3,74,29,170		4,95,12,495	
		Bonds	-		-	
		Short Term Deposits with Banks	73,96,58,459	77,70,87,629	67,13,56,902	72,08,69,397
C		**LOANS, ADVANCES & OTHER ASSETS**				
		a) i) Deposits with Govt.Depts & others	2,55,94,258		2,15,94,326	
		ii) Deposits with Revenue Authorities (Payment under Protest)	6,05,28,260		6,05,28,260	
		b) Advances to Employees	41,79,419		25,65,496	
		c) Prepaid Expences	7,48,478		6,25,477	
		d) Accrued Interest	8,64,72,935		8,47,23,494	
		e) TDS Receivables	20,19,90,318		69,93,96,763	
		f) Claims Receivables	4,85,19,678		8,19,23,382	
		g) Capital Advances	51,724		4,94,190	
		h) Other Advances	25,94,417		77,02,226	
		i) Deposit to NHPTL	6,00,00,000	49,06,79,489	6,00,00,000	101,95,53,615
		TOTAL		**441,81,94,769**		**428,04,27,373**

Place: Bangalore.
Date: 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2021

(Amount in Rs.)

	SCHEDULE 9	Current Year	Previous Year
	INCOME FROM TEST FEE & CONSULTANCY		
a)	Test Fee	117,11,52,751	127,97,50,508
b)	Consultancy Services Charges	10,14,71,575	18,67,17,080
	TOTAL	**127,26,24,326**	**146,64,67,588**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2021

(Amount in Rs.)

	SCHEDULE 10	Current Year	Previous Year
	FEES		
a)	**Training Fee**	35,83,542	102,10,000
b)	**Seminar Fee**	8,20,000	91,36,003
	TOTAL	**44,03,542**	**1,93,46,003**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2021

(Amount in Rs.)

	SCHEDULE 11	Current Year	Previous Year
	INTEREST EARNED		
a)	Interest on Term Deposits with Banks & Financial Institutions	8,83,22,731	9,86,85,830
b)	Interest on Loans & Advances to Employees	7,93,909	8,86,155
	TOTAL	**8,91,16,640**	**9,95,71,985**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2021

(Amount in Rs.)

		SCHEDULE 12	Current Year	Previous Year
		OTHER INCOME		
1)		**Fees for Miscellaneous Services**		
	a)	Sale of Publications	13,000	4,000
	b)	Library Receipts	100	150
2)		**Miscellaneous Income**		
	a)	Application fee on recruitment	2,19,200	3,400
	b)	Sale of Tender forms	80,500	2,49,961
	c)	Licence fees	17,59,414	20,90,778
	d)	Rent Receipts	18,02,650	17,38,390
	e)	Sale of Scrap	52,44,974	1,31,630
	f)	Others	8,14,213	5,56,830
	g)	Interest Received on Income Tax Refunds	11,77,86,159	1,06,10,261
	h)	Provision for Doubtful Debts Realised	7,366	25,58,415
		TOTAL	**12,77,27,576**	**1,79,43,815**

* Provision for Doubtful Debts realised has been regrouped under Income schedule.

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2021

(Amount in Rs.)

	SCHEDULE 13	Current Year	Previous Year
	RESEARCH ESTABLISHMENT EXPENSES		
a)	Salaries and Wages including Bonus	52,26,85,896	55,76,94,817
b)	Staff Welfare Expenses	1,58,36,680	2,54,36,244
c)	Expenses on Employee's Retirement and Terminal Benefits	40,35,00,000	35,00,00,000
d)	Expenses on Medical Facilities	84,76,178	1,33,64,575
	TOTAL	**95,04,98,754**	**94,64,95,636**

Place: Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2021

(Amount in Rs.)

	SCHEDULE 14	Current Year	Previous Year
	RESEARCH ADMINISTRATIVE EXPENSES		
a)	Electricity and Power	7,96,27,298	8,39,00,693
b)	Water Charges	9,28,426	7,35,298
c)	Office Expenses	4,31,10,807	5,21,76,279
d)	Repairs and Maintenance	12,28,04,277	18,62,14,338
e)	Rent, Rates and Taxes	10,30,354	10,94,648
f)	Vehicles Running and Maintenance Expenses	10,51,800	12,96,917
g)	Postage, Telephone and Communication Charges	19,00,761	25,24,281
h)	Printing and Stationary	7,62,880	28,53,932
i)	Travelling and Conveyance Expenses -Inland	4,81,132	91,99,395
	Travelling and Conveyance Expenses -Foreign	-18,584	29,58,615
j)	Expenses on Seminar & Workshops	10,86,697	81,88,918
k)	Subscription Expenses	68,000	82,678
l)	Expenses on Fees	1,31,320	25,768
m)	Auditors Remuneration	65,000	1,45,000
n)	Professional Charges	4,83,340	13,46,485
o)	Library Expenses	15,73,019	34,08,794
p)	Training Expences	1,90,328	6,33,296
q)	Publication Expenses	47,000	33,000
r)	Advertisement and Publicity	19,78,528	40,06,892
s)	Research & Development Expenses	-	-
t)	Transfer to 'Reserve for Capital Expenditure' during financial year 2018-19	-	37,70,00,000
	TOTAL	25,73,02,384	73,78,25,224

Place: Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2021

(Amount in Rs.)

	SCHEDULE 15	Current Year	Previous Year
	DEPRECIATION		
a)	Depreciation for the year	26,14,94,303	25,85,88,184
b)	Revised Depreciation	-	(48,43,57,224)
	TOTAL	**26,14,94,303**	**-22,57,69,040**

Place : Bangalore,
Date : 13-08-2021

CENTRAL POWER RESEARCH INSTITUTE

Schedule forming part of Income & Expenditure for the year ended 31st MARCH 2021

SCHEDULE 15
DEPRECIATION

YEAR	GROSS BLOCK				DEPRECIATION						NET BLOCK	
	OB	Additions		TOTAL	%	OB not Charged to I&E	OB Charged to I&E	For the Year	Total charged to I&E	Total	OB	CB
		Additions	Transfer from W-I-P to Assets									
1	2	3	4	5		6	7	8	9	10	11	12
				(2+3+4)					(7+8)	(6+9)	(2-6-7)	(5-10)
Land	6,96,84,860	-		6,96,84,860							6,96,84,860	6,96,84,860
Buildings	1,19,11,78,026	17,10,194	-	1,19,28,88,220	3.17	21,46,07,660	27,68,90,328	3,53,79,319	31,22,69,647	52,68,77,307	91,42,87,698	66,60,10,913
Buildings (ICICI)	42,79,967	-	-	42,79,967	3.17	3,58,374	14,92,424	1,35,675	16,28,099	19,86,473	27,87,543	22,93,494
Plant & Machinery	6,87,72,91,428	2,59,26,560	-	6,90,32,17,988	3.17	1,52,93,55,831	1,84,86,67,284	21,13,58,155	2,06,02,25,438	3,58,95,81,269	5,02,84,24,144	3,31,36,36,719
Plant & Machinery (ICICI)	4,47,14,841	-	-	4,47,14,841	3.17	55,59,645	1,55,80,296	14,17,460	1,69,97,757	2,25,57,401	2,91,34,545	2,21,57,440
Plant & Machinery (Spons)	35,13,50,617	54,68,325	-	35,68,18,942	3.17	2,73,85,799	5,22,70,217	1,14,33,046	6,37,03,264	9,10,89,063	29,90,80,400	26,57,29,879
Furniture & Fixtures	3,28,55,443	2,24,921	-	3,30,80,364	6.33	67,23,812	1,22,69,774	17,26,713	1,39,96,487	2,07,22,299	2,05,85,669	1,23,58,064
Vehicles	55,81,762	-	-	55,81,762	9.50	34,40,892	15,04,145	41,935	15,46,079	49,86,971	40,77,617	5,94,791
Library Books	1,53,20,774	-	-	1,53,20,774	95.00	-	1,45,54,735	-	1,45,54,735	1,45,54,735	7,66,039	7,66,039
Films (Documentry)	2,25,153	-	-	2,25,153	95.00	-	2,13,895	-	2,13,895	2,13,895	11,258	11,258
Sub Total	**8,56,24,52,871**	**2,33,30,000**	-	**8,62,58,12,871**		**1,76,74,32,013**	**2,22,36,43,098**	**26,14,94,303**	**2,48,51,37,402**	**4,27,25,69,415**	**5,36,88,39,773**	**4,35,32,43,456**

SCHEDULE 15A
Work-in-Progress

Work-in-Progress	Opening WIP	Addition	Transfer to WIP	Closing WIP
Capital Works in Progress (M o P)	2,87,98,03,105	39,62,31,663	-	3,27,60,34,768
Capital W-I-P (CPRI)	14,48,20,308	1,61,89,554	-	16,10,09,862
Total (B)	**3,02,46,23,413**	**41,24,21,217**	-	**3,43,70,44,630**
TOTAL	**11,61,71,06,284**		-	**12,06,28,57,502**

Place: Bangalore,
Date : 12-08-2021

Schedule – 16

Significant Accounting Policies attached to and forming part of Accounts for the year ended 31st March 2021.

Background: - The Institute, an autonomous body under Govt. of India, Ministry of Power established through a resolution vide No.33 (14)/74-Policy: dated 21/10/1974 is totally focused on Power Research. The Institute has been recognized by Ministry of Science & Technology as an S&T Institution. The Institute has been further recognized as Scientific and Industrial Research Organization by Government of India, Ministry of Science and Technology vide their letter No. 11/68/88-TU-V, dated 05/04/2017 and valid up to 31.03.2021. The Institute as a legal entity is registered with the Registrar of Societies. The basic objectives of the Institute is to serve as a National Testing & Certification Authority and act as an apex body for initiating and coordinating Research and Development in the field of electric power. The Government of India is supporting the activities through grants. Additionally, the Institute is generating revenue for regular maintenance through test fees and professional services rendered to Government organizations/Electricity Boards/Commercial organizations etc.

1. **Method of Accounting:**
   The financial statements have been prepared to comply with the Generally Accepted Accounting Principles. The financial statements have been prepared under the historical cost convention on an accrual basis. The accounting policies have been consistently applied by the Institute. The Bonus paid to employees are accounted in the year of payment.

2. **Fixed Assets:**
   Fixed assets are stated at cost. Cost comprises the purchase price and any attributable cost of bringing the asset to its working condition for its intended use. Financing costs relating to acquisition of fixed assets are also included to the extent they relate to the period till such assets are ready to be put to use.

   The Grants are contribution by Govt. of India towards total capital outlay of Projects and no repayment of the same is ordinarily expected. Fixed assets acquired under Capital Projects, R & D Plan, Sponsored Schemes and loans are stated at their original cost of acquisition. The funds provided for acquisition of these Fixed Assets under Grant-in-Aid from Government of India / other Agencies are exhibited as Capital Reserve.

   Fixed Assets acquired out of Non Plan funds were being capitalized @ Rs.1-00 per asset and the balance amount charged to Income & Expenditure account from the financial year 2002-03 to 2014-15. From the financial year 2015-16, fixed assets acquired out of Non Plan funds are capitalized at full value and depreciation provided as applicable.

   The Institute is a non-profit organization and therefore depreciation on assets capitalized was not provided in the accounts up to 2006-07. However, as per the decision of the Governing Council (G.C), the Depreciation was provided on the new Schemes from 2007-08 as per the rates provided in the Income Tax Rules, 1962 on written down value basis. Further, the G.C in its meeting held on 16th Nov 2009, instructed the Institute to provide depreciation from the financial year 2009-10 on all assets and the Government of India vide No.4/11/2009-T&R dated 30-03-2010 directed to provide depreciation every year by a charge to the Income & Expenditure Account on Straight line method basis.

Accordingly, the depreciation has been provided from 2009-10 on Straight line method as per the rates determined by the Management (based on the useful life of the assets) on all the assets and the total depreciation not provided for upto 31st March 2019 is of the order of Rs.245,21,89,649/- (for assets additions from 1981) as stated in the Annual Accounts upto 31-03-2019. The useful life was taken for Buildings at 28 years and Plant & Machinery at 20 years. A review of useful life of assets was made. As per the approved project proposals for creation of Capital Assets, the project period is taken at 30 years. Therefore for depreciation, the useful life of Buildings and Plant & Machinery is taken at 30 years and hence depreciation not provided worked out to Rs.1,78,74,32,013/-. Accordingly depreciation for the year 2019-20 is also charged at the revised rates.

There is a difference between the Capital Reserve and Fixed Asset Gross block to the tune of Rs.5.51 Crores. **1.** During the financial year 2010-11 an amount of Rs.482.34 lakhs being the proceeds of sale of assets at TRC, Koradi was received and fixed assets to the tune of Rs.482.34 lakhs was reduced in Fixed Asset schedule but not in Capital Reserve same rectified by reducing in capitalization and added to Grant Receipt during the year FY 2017-18. **2.** During the financial year 2009-10 an amount of Rs.9.81 lakhs being the proceeds of sale of assets was received and fixed assets to the tune of Rs.9.81 lakhs was reduced in Fixed Asset schedule but not in Capital Reserve same rectified by reducing in capitalization and added to Grant Receipt during the year FY 2017-18. **3.** Similarly an amount of Rs.495.00 lakhs was capitalized, but actual assets capitalized was Rs.489.95 lakhs, thus difference of Rs.5.05 lakhs was rectified by reducing in capitalization and added to General Reserve. **4.** Similarly the surplus on sale of Fixed Asset of Rs.54.13 lakhs as on 31-03-2017 has been added to the Capital reserve same was rectified by reducing in capitalization and added to Grant Receipt during the FY 2017-18.

Depreciation on Library Books & Films (Documentary) charged at 95% of Book Value.

Capital work-in-progress includes expenditure on Civil Works of projects, which have not been completed as at the end of the year.

3. **Depreciation Fund**:

As per direction from Governing Council, Depreciation fund is created as on 01-04-2019. The interest earned/accrued is added to the fund. Current year depreciation also was provided and added to fund.

4. **Investments:** Investments are shown at cost.

5. **Inventories:**
Inventories of stores and spares are shown at cost and cost includes expenses incurred for procuring the same wherever directly attributable. All consumables purchases are charged off at the time of procurement.

6. **Research and Development:**
Research expenditure on Research and Development is charged against the receipt of research grants. Capital expenditure on Research & Development is treated in the same manner as expenditure on other fixed assets.

7. **Foreign Currency Transaction:**
Transactions in Foreign Currency are recorded at a notional rate of exchange.

Realized gains and losses on Foreign Currency transactions are effected in the Income and Expenditure Account. The balances are recast at the end of the year based on the rate prevailing as On 31st March.

8. **Revenue Recognition:**
The Revenue in respect of Test Fees and Consultancy charges are accounted on completion of work / report. The policy of the Institute is to account the 'TDS Receivables 'on receipt of Form 16 from the client.

Interest income on deposits relating to CPRI with banks is recognized on time proportionate basis.

9. **Retirement Benefits:**

(i) **Post – employment benefit plans:**

(a) Defined Contribution Plan –
Contribution to New Pension Scheme are accrued in accordance with applicable statute and managed as per Government rules and regulations.

(b) Defined Benefit Plan
The liability towards retirement benefits like Pension, Gratuity and Leave Encashment are ascertained on the basis of Projected Unit Credit Method with actuarial valuation and provided in the books of accounts.

(ii) **Short term employment benefits:**
The undiscounted amount of short term employee benefits expected to be paid in exchange for services rendered by employees is recognized during the period when the employee renders services. These benefits include compensated absence and other incentives.

(iii) **Pension payments:**
Pension payments are accounted for April to March every year.

As per our report of even date
for M.A NARASHIMAN & CO.,
Chartered Accountants,
FRN 002347S

(C.S.MURALI KRISHNA)
Chief Accounts Officer

(V.S. NANDAKUMAR)
Director General

(M.A.PARTHA NARAYAN)
Partner
Membership No.028994

Place: Bangalore
Date: 13-08-2021

Schedule – 17

Notes on Accounts & Contingent Liability attached to and forming part of Accounts for the year ended 31st March 2021.

1. **Fixed Assets and Depreciation:** -Upto 2002-03, the Institute capitalized all costs relating to the acquisition and installation of all fixed assets. From the year 2002-03 onwards, the Institute has changed its policy for accounting capital assets as under

   - ➔ All assets acquired under Capital Projects, R&D Plan, Sponsored Schemes, RSOP Schemes are capitalized with all costs relating to their acquisition.

   - ➔ All assets acquired-out of Non-Plan (Revenue) expenditure of the Institute were charged off to the Income & Expenditure account from the financial year 2002-03 to 2014-15. Total value of assets charged off from 2002-03 to 2014-15 is Rs.1691.00 lakhs. In the financial year 2015-16, the Institute started to capitalize 'at cost' all assets acquired out of Non-Plan (Revenue) expenditure and depreciation provided as applicable.

   - ➔ The Institute is maintaining a fund "Maintenance, Repairs and Obsolescence – Fund" by charging certain amount to the Income & Expenditure Account. The Institute is utilizing this fund towards revenue and certain capital expenses. As the charge is already provided to the Income & Expenditure account, depreciation is not provided on such assets acquired out of this fund. The value of such assets is Rs.140.87 lakhs for 2020-21 (Rs.167.60 lakhs for the previous year) and Rs.1569.41 lakhs up to 2020-21.

2. **Government Grant:** - Grant received from the Government of India and other organizations towards specific projects are shown as capital/sponsored grants. The Institute confirms compliance of all the conditions of the grant. The Institute consistently has followed the procedure of showing the assets procured from such grants under the Fixed Assets.

3. **Reserve for Capital Expenditure out of CPRI generated funds:** -
   (a) Ministry of Power, Government of India, vide letter No. 5/4/2013-T&R dated 25-02-2014 while conveying approval for the project 'Augmentation of New Facilities Projects' for Rs.105.90 Crores has directed C.P.R.I. to (i) bear 10% of the total outlay of the projects i.e., Rs.10.59 Crores and (ii) also bear additional funds, if any required over and above the approved outlay including any escalation of FE component of the project, from its internal resources. In the same way Ministry of Power, Government of India, vide letter No. 5/5/2014-T&R dated 05-01-2015 while conveying approval for the project 'Augmentation of High Power Short Circuit Test facilities and establishment New Facilities Projects' for Rs.996.10 Crores, has directed C.P.R.I. to (i) bear 10% of the total outlay of the projects i.e., Rs.99.61 Crores and (ii) also bear additional funds, if any required over and above the approved outlay including any escalation of FE component of the project, from its internal resources.

   The total amount to be contributed by C.P.R.I. on account of above mentioned projects is Rs.110.20 Crores. To meet the above expenditures, C.P.R.I. has created a reserve by name "Reserve for Capital Expenditure out of CPRI generated funds" and the credit balance under this reserve as on 31-03-2021 is Rs.83.52 crores.

   (b) National High Power Test Laboratory Pvt. Ltd. is a Joint Venture of NTPC, NHPC, Power Grid, DVC and CPRI. The total equity of NHPTL is Rs.152.00 Crores, contributed equally by JV Partners of Rs.30.40 Crores each.

CPRI had contributed the amount by obtaining Plan Grant of Rs. 24.00 Crores from MoP and the balance of Rs. 6.40 Crores was contributed from Internal Resources. M/s. N.H.P.T.L. requested to provide temporary loan of Rs.6.00 Crores from each JV Partner vide letter no.NHPTL/JVs/1643 dated 21.03.2018 towards repayment of loans to M/s. Power Finance Corporation. The same was paid on 28.03.2018 from CPRI General Reserve with the approval of Ministry of Power vide letter no.31-4/1/2018-T&R dated 27.03.2018 for a period of 3 months. Later on as NHPTL had requested for extension of the temporary loan for another 3 months as they were in the process of negotiating larger loan from Banks and Financial Institutions vide their letter No. NHPTL_F&A/019 dated 14.06.2018. The extension of period for temporary loan was obtained from MoP vide letter no. 31-4/1/2018- T&R dated 26.06.2018. The temporary loan is still not settled by M/s NIIPTL since NHPTL has requested to provide additional loan of Rs. 12.40 Crores from each JV Partner. CPRI is receiving simple interest @ 10% p.a. on the temporary loan amount.

In accordance with the approval of Government of India, Ministry of Power vide letter No. 5/18/2007-T&R dated 16-01-2012, an amount of Rs.2,390.00 lakhs has been paid towards initial equity contribution in M/s National High Power Test Laboratory Pvt Ltd., New Delhi, (M/s NHPTL) a Joint Venture Company of 5 equity partners viz., NTPC, NHPC, POWERGRID , DVC & C.P.R.I. The total equity share of C.P.R.I. would be Rs.2,400.00 lakhs being 1/5th equal share of the total equity capital of Rs.12,000.00 lakhs, equally shared by all the 5 equity partners.

2,39,00,000 shares of Rs.10.00 each for total amount of Rs.2,390.00 lakhs was allotted and Share Certificates have been issued to C.P.R.I. M/s N.H.P.T.L, called for allotment of 1,00,000 shares of Rs.10.00 each during February 2017 and the same was paid to M/s N.H.P.T.L.

M/s N.H.P.T.L. has decided to increase its Equity capital. Hence it has asked C.P.R.I. to pay an amount of Rs.640.00 lakhs, towards allotment of 64,00,000 shares of Rs.10.00 each. Ministry of Power, Government of India, has asked C.P.R.I. to make this investment of Rs.640.00 lakhs out of its own Funds / Reserve and accordingly the amount of Rs.640.00 lakhs was paid to M/s N.H.P.T.L. during February 2017. The shares were allotted to us and the share certificate for Rs.650.00 lakhs has been received.

M/s. N.H.P.T.L. requested to provide temporary loan of Rs.600.00 lakhs from each JV Partner vide letter no.NHPTL/JVs/1643 dated 21.03.2018 towards repayment of loans to M/s. Power Finance Corporation. The same was paid on 28.03.2018 from CPRI General Reserve with the approval of Ministry of Power vide letter no.31-4/1/2018-T&R dated 27.03.2018 for a period of 3 months.

4. **Retirement Benefits**:- The liability on account of Pension, Gratuity etc., was evaluated as on 31.03.2021 through M/s Trans Value Consultants (Actuaries and Financial Consultants) and the liability has been estimated at Rs.79,779.90 lakhs. The Governing Council at its meeting held on 17.10.2007, directed for meeting the liability from internal resources/charging to Income & Expenditure Account.

As such Rs.9,035.00 lakhs was required to be provided. However considering available surplus, a sum of Rs.4,035.00 lakhs has been charged to Income & Expenditure Account during the current year. The cash of Rs.4,035.00 lakhs will be transferred to Superannuation Fund during the financial year 2021-22.

5. **Income Tax Cases :--**

The CBDT vide Notification No.27/2016 (F.No. 203/32/2015/ITA-II) dated 07-04-2016 has notified C.P.R.I. in the category of 'Scientific Research Association' under Section 35 and sub section (i) and (ii) of Income tax Act 1961 from Assessment Year 2003-2004 onwards and consequently C.P.R.I. has become eligible for exemption from Income Tax under section 10 (21) of the Income Tax Act 1961.

C.P.R.I. has applied for refund of TDS of Rs.25.43 lakhs for AY 2006-07 and for AY 2014-15 there is an outstanding TDS to the tune of Rs.901.07 lakhs.

Sl. No.	A.Y.	Issue and status of the of the cases as on 31.03.2021
1	2011-12 2012-13 2013-14 2014-15	Appeal was filed with ITAT, "C" Bench regarding taxability of Quarters occupation under perquisites and the appeal was party allowed vide order dated 13.10.2017. The case is pending with Income Tax Department.
2	2014-15	Appeal was files with CIT (A)-14 and a personal hearing was attended on 31.01.2019 and awaited for order from the CIT (A)-14. On follow up it is understood that the file has been moved for "Faceless Assessment Scheme".

6. **Service Tax Cases:-**

A) As per order no. 35/Commr/ST/ADJ/BPL-I/2014 dated 31.01.14, the Commissioner, Central Excise & Service Tax, Bhopal has raised a demand of Rs. 8,09,51,984/- (Service Tax, Interest and Penalty) alleging non-payment of Service Tax on Advance Payment received during the period July 2005 to June 2011. An appeal is filed against the said order with the CESTAT, New Delhi on 24.4.2014 which is pending for adjudication.The Hon'ble Tribunal Bench of CESTAT vide its Order dated 07-10-2015 has ordered for a deposit of Rs.5,67,91,862/- . The Institute complied with the Order and deposited Rs.5,67,91,862/- being the demand of Service Tax along with Interest. An appeal has been filed on 22.11.2017 in the Hon'ble High Court of M.P Jabalpur and the case is pending.

B) The Asst. Commissioner of Service Tax Service Tax Division II, Bangalore vide Order No.28/2013, dated 24.06.2013 has raised a demand of Rs.52,952/- as Interest on belated payment of Service Tax on Advance Deposits. The Institute has filed an appeal before the commissioner of central excise against the Adj. Order on 14-09-2013.

C) A Show Cause Notice No.C.No.IV/01/51/2013 ST Divn.II/1973/13, Dt 09/05.2013 issued, demanding Rs.2,06,712/- being ineligible cenvat credit claimed on "Hiring of Vehicles" and "Catering Services" during the year 2011-12. A reply was given to this Show Cause Notice vide letter dated 30.08.2013. On receipt of reply from CPRI, a demand for Rs.1,13,410/- towards CENVAT on catering services was allowed vide Order No. 32/2015 dated 27-11-2015. The authorities disallowed CENVAT credit of Rs.93,302/- on 'rent-a-cab' for which CPRI has filed an appeal for availing CENVAT credit.

D) The audit team of Service Tax department audited the accounts for the period from October 2013 to March 2015. In the Audit Report, they demanded to pay a sum of Rs.25,46,328/- , out of which an amount of Rs.2,79,494/- was remitted. CPRI filed an appeal for remaining amount of Rs.22,66,834/- and the case is pending.

7. **Other Cases** :-
CPRI had received a request for refund of unutilized test charges of Rs.4,10,900/- from M/s. Jabshetty Transformers, Gulburga during the month of May 2016 through their representative, Shri B Puttaraju who was a regular visitor to the Institute on behalf of M/s. Jabshetty Transformers. For transferring the amount, CPRI had requested M/s. Jabshetty Transformers for RTGS details which they provided through an email. Based on the RTGS details given by them, CPRI transferred Rs.4,10,900/- to the account as provided ie. M/s. M&CDCC Bank Ltd., Mysore

On informing M/s. Jabshetty Transformers through email about the transfer of the above amount, they informed back that they did not ask for refund/transfer and also no money had reached to their account. On enquiry it was found that Shri B Puttaraju, the representative of the M/s.Jabshetty had fictitiously created another account in the name of M/s.Jabashetty Transformers in M&CDCC Bank Ltd., Mysore.

M/s.Jabshetty Transformers has sent legal notice for refunding the amount which was transferred to M/s. Jabashetty Transformers Account. This is being defended by our Legal Advisers, Ravi, Suri & Sunitha, Malleswaram, Bangalore. A case was also filed in this regard, in the Sadashivanagar Police Station on 20th Oct. 2016. The matter is still pending.

8. **Contingent Liabilities**: -

a) On account of Letter of Credit opened and remaining to be honored – NIL (excepting Letter of Credits with 100% margin) (NIL for 2019-20).

b) Estimated amount of liability on account of capital contracts – Rs.19,752.75 lakhs. (Rs.21,972.54 lakhs for 2019-20).

c) Claims not acknowledged as debts by the Institute – NIL

d) Bank Guarantees furnished to various clients by the Institute is of the value of Rs.274.29 lakhs as on 31.03.2021 backed by deposits to the full extent.

e) The total amount of Demand received from Service Tax Department (as provided in para 6 above) is Rs.836.44 Lakhs.

9. **Sponsored Projects** :-
The Institute is engaged in core research activity funded by Government Grants. Apart from this, research activity for Government, Semi-Government and private agencies are also carried out on Sponsored basis. The cost of such research is fully funded by such agencies. The element of service if any in such activity is separately identified and charged.

10. The Institute has a system of Internal Audit conducted by a firm of Chartered Accountants.

11. The grant balances shown at Schedule–4 are exclusive of margin money deposits for LC establishment towards the import of equipments. The margin money deposits as on 31.03.2021 are Rs.7,277.61 lakhs (Rs.8,346.63 lakhs as on 31.03.2020).

12. Accrued Interest on Investments made in Public Sector Undertakings is calculated based on simple interest method.

13. Figures for the previous year have been regrouped wherever necessary to conform to the presentation of the current year.

As per our report of even date

for M.A NARASHIMAN & CO.,
Chartered Accountants,
FRN 002347S

(C.S.MURALI KRISHNA)
Chief Accounts Officer

(V.S. NANDAKUMAR)
Director General

(M.A.PARTHA NARAYAN)
Partner
Membership No.028994

Place: Bangalore,
Date: 13-08-2021