Azadi Ka Amrit Mahotsav

CENTRAL POWER RESEARCH INSTITUTE

केन्द्रीय विद्युत अनुसंधान संस्थान
CENTRAL POWER RESEARCH INSTITUTE
बेंगलूर
BANGALORE
स्थापित 1960 ESTD 1960

Annual Report 2021-22

FORWORD

CPRI, the premier Research Institute in our country, is actively involved in undertaking and coordinating the Research & Development projects in the focused area of Power Sector.

CPRI being one of the largest test laboratories in the world has built up expertise to cater to the entire gamut of services required by Power Sector covering Generation, Transmission and Distribution under one roof. CPRI serves as the National Testing and Certification Authority for power equipment ensuring electrical industries to manufacture quality products and the utilities to ensure Quality, Reliable and Safe power supply.

It gives the entire fraternity and stakeholders of CPRI immense pleasure that, CPRI has been accredited for ISO / IEC 17065 by National Accreditation Board for Certification Bodies (NABCB) for Product Certification of Electrical equipment. This is considered to be an important step towards widening International acceptance of Indian Electrical Equipment – Valuable boost to 'Make in India' and 'Atmanirbhar Bharat' for Indian Electrical Industry.

To meet the demands of the growing Electrical industries, CPRI continuously augments its existing test facilities and establishing new test facilities to carry out testing as per relevant National and International standards

(V.S. Nandakumar)
Director General

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Governing Council
Central Power Research Institute
(Present Composition)

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

Shri Ghanshyam Prasad
Chairperson, CEA
Vice-President, Governing Council

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

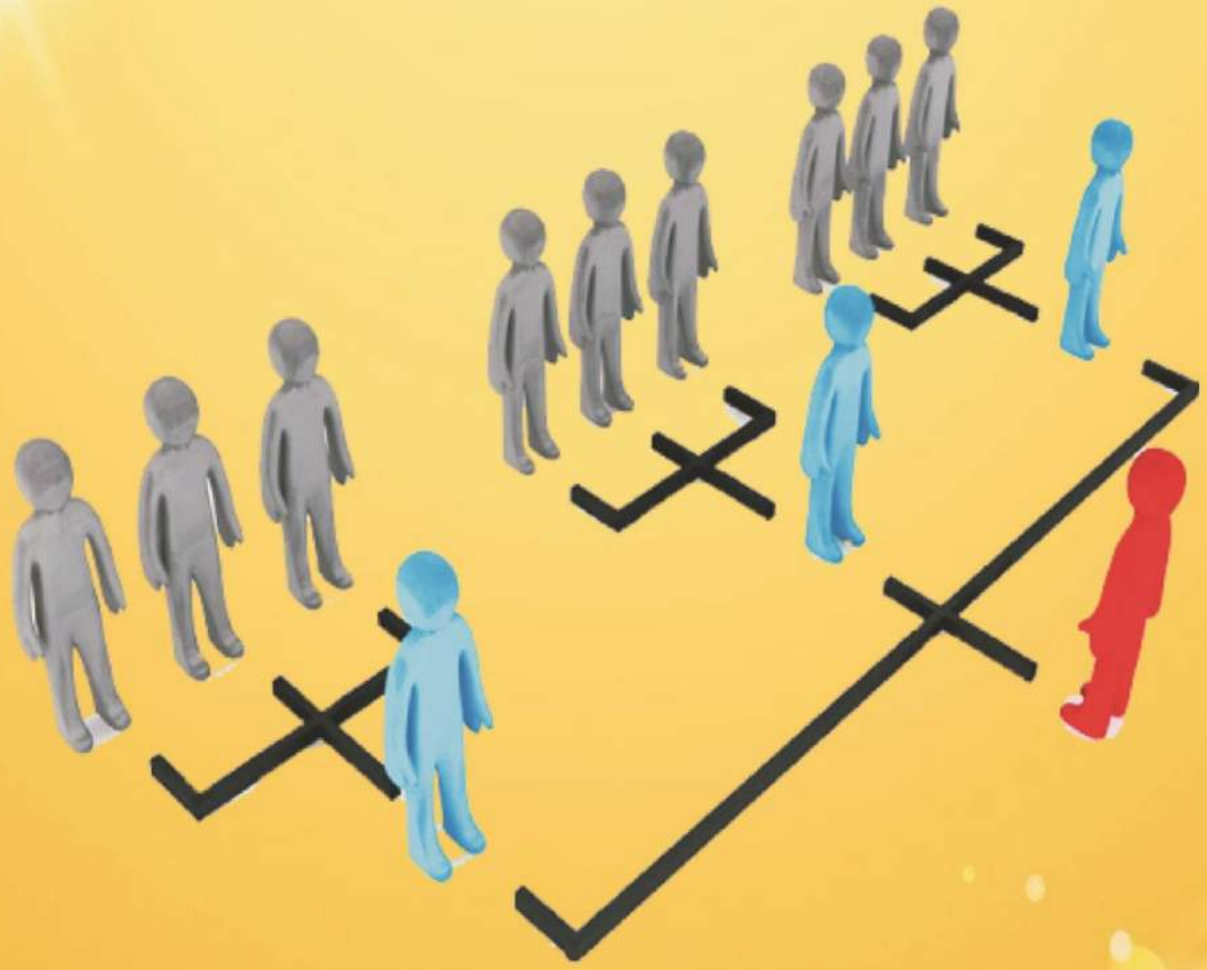
Shri Ajay Tewari, IAS
Additional Secretary
Ministry of Power
Member, Governing Council

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. The 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. The Member (Power System), Central Electricity Authority	Member
7. The Member (Planning), Central Electricity Authority	Member
8. The Secretary, DSIR, Ministry of Science & Technology	Member
9. The Secretary, Ministry of Commerce & Industry, Dept. of Industrial Policy & Promotion	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 Limited (BESCOM)	Member
17. The Managing Director, Dakshin Haryana Bijli Vitran Nigam Ltd. (DHBVN)	Member
18. The Director, Indian Institute of Technology, New Delhi	Member
19. The Director, Indian Institute of Technology, Madras, Chennai	Member
20. The Director, Indian Institute of Technology, 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

www.cpri.res.in

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 Organisations 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 test tariff related activities. The Committee is chaired by Member (Power Systems), CEA.

Organisational Chart of CPRI as on 31st March 2022

Director General

Group Head
MED,EMD,HV, EVRC
HoD-DSD & MUAD

- HoD - MED
- HoD - EMD
- HoD - HV
- HoD - EVRC

Group Head
MTD, Plg & Co-ordn,R&D, I&PD, Certification Divn, Trg Divn
HoD - DMD

- HoD - MTD
- HoD - Plg & Co-ordn
- HoD - R & D
- HoD - I & PD
- HoD - Certification Divn.
- HoD - Trg

Group Head
EATD, Purchase, CD, ERED
HoD-SC Lab & HRT Lab

- HoD - EATD
- HoD - Purchase
- HoD - CD
- HoD - ERED & I/c Library

Group Head
PSD, CDD, CED
HoD - HPL

- HoD - PSD
- HoD - CDD
- HoD - CED

Unit Head - STDS, Bhopal

Unit Head - UHVRL, Hyd

Unit Head - RTL, Noida

Unit Head - TRC, Nagpur

Unit Head - RTL / K & G

Chief Admn Officer

- Admn I & II
- Official Language Section
- Security

Chief Accts Officer

- Accts I & II

- Dr. Thomas P — Appellate Authority, Public Information
- Shri Janardhana M — Central Public Information Officer
- Shri Kishore Kumar G — Assistant Public Information Officer
- Shri Swaraj Kumar Das — Public & Staff Grievance Officer
- Shri P Kaliappan — Liaison Officer SC/ST & PWD
- Shri Mallikharjuna Rao T — Liaison Officer OBC
- Dr. T. Bhavani Shanker — Quality Manager
- Dr. J Sreedevi — Women Welfare Officer
- Shri Rajkumar N — Management Representative ISO 9001

Central Power Research Institute - Bengaluru and its Units

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

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

Thermal Research Centre
Khasamari Road
Adjacent to Ultratech Cement
Dhuti, Wardha Road
Dongargaon
Nagpur -441 108

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, BN 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 (CDD)

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 divisions 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.

Capacitors Division (CD)

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

The Division offers Consultancy and field engineering services for;

a. Root cause analysis of premature failure of capacitors.
b. Online 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. The Division has Expertise in Furan analysis and 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, the Division 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 & 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 a unique state-of-the-art communication protocol laboratory with facility to test energy meters and substation communication equipment as per IEC / MODBUS/ DNP protocol standards.

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

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
- Remaining Life Assessment and Renovation & Modernization
- Industrial Solid Waste Utilization

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 Laboratory 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:

- Testing and Calibration of Phasor Measurement Unit (PMU) as per IEC/ IEEE 60255.118.1:2018 standards for both M and P Class. The PMU test and Calibration System covers both steady state and dynamic conditions of the Electrical Power Grid.

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.

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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 now relocated with many other facilities at Dhuti Village in 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 the "R&D schemes of the Ministry of Power (MoP) being implemented through CPRI" with details as given below:

i. In-House Research 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)

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 D.G., 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 can be avoided.

The Apex Committee of IMPRINT-I chaired by Secretary (Higher Education), Ministry of Education (MoE) 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 MoE, 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 the MoE 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 Projects (IHRD)

In-house research 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 2021-2022, following is the summary of the ongoing In-house Research 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 microgrid 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, Cables & Diagnostics Division, CPRI, Bengaluru	48.47	1.5 years

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
4.	Development of an Indigenous RTV Coating with enhanced Thermal Conductivity for use on ceramic Insulators	Insulation Division, Cables & Diagnostics Division, CPRI, Bengaluru	30.00	2 years
5.	New Generation Ethylene Vinyl Acetate (EVA) nano-composites with high UV shielding properties for Photovoltaic Modules	Insulation Division, Cables & Diagnostics Division, CPRI, Bengaluru	27.50	1.5 years
6.	Development of Polymeric Films for High Energy Density Capacitors Application	Dielectric Materials Division, CPRI, Bengaluru	94.60	1.5 years
7.	Computational design and Development of Green Insulating fluids for power transformers: Renewable non-edible oil	Dielectric Materials Division, CPRI, Bengaluru	27.28	1.5 years
8.	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
9.	Development of vegetable ester based nano fluids for transformers	Dielectric Materials Division, CPRI, Bengaluru	40.70	1.5 years
10.	Determination of Stability of Mineral Insulating oils by Rapid Small Scale Oxidation Technique (RSSOT)	Dielectric Materials Division, CPRI, Bengaluru	36.74	2 years

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
11.	Development of an Indigenous RTV Coating with enhanced Thermal Conductivity for use on ceramic Insulators	Insulation Division, Cables & Diagnostics Division, CPRI, Bengaluru	30.00	2 years
12.	Development Of Heat Pipe Based Super – Heaters And Re- Heaters To Prevent Boiler Forced Outages	Materials Technology Division, CPRI, Bengaluru	48.73	2 years
13.	Design and development of a dynamic protection scheme for utility with bulk electric vehicle charging	Power Systems Division, CPRI, Bengaluru	86.46	2.5 years
14.	Development of High Energy Density Composite Materials for Fast charging Lithium Ion Battery	Electrical Appliances Technology Division, CPRI, Bengaluru	84.70	2 years

For the year 2021-22, 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.	Development of LDPE, MDPE and HDPE Nano-composite for DC Cable Application	Cables & Diagnostics Division, CPRI, Bengaluru	105.00	2 years

2.	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
3.	Development and demonstration of 1 k W soluble lead redox flow battery system for solar energy and retrieval	Electrical Appliances Technology Division, CPRI, Bengaluru	77.00	2 years
4.	Smart Transmission through Wide Area Measurement System to control and co-ordinate HVDC/FACTS devices	Power Systems Division, CPRI, Bengaluru	110.00	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 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 2021-2022, the following is the summary of the ongoing RSoP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1.	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
2.	IEC 61850 Compliant SF6 Monitoring System for Gas Insulated Switchgear	VSSUT, Burla	48	2 years
3.	Development of Nanocrystalline Materials for Solid Oxide Fuel Cells working at 600 degree C	Karunya Institute of Technology and Sciences, Coimbatore	27.46	1.5 years
4.	Analysis of Performance of Inclined Plate Anchors Embedded in Geosynthetics Reinforced Soils for Transmission Tower Foundations	IISc, Bengaluru	31.96	1.5 years
5.	Investigations on Control Flexibilities of Grid Integrated Solar Photo Voltaic Energy Conversion System	NIT, Warangal	31.10	1.5 years
6.	Design and Development of RF Sensors for Identification and	IITM, Chennai	38.40	1.5 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
	Localization of Incipient Discharges in GIS			
7.	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
8.	Model Order Reduction for Simulation Acceleration in Power Electronics	NIT, Srinagar	7.02	1.5 years
9.	Design, Development and Validation of a New Adaptive Digital Relaying Scheme for Power Transformer	IIT, Roorkee	47.73	1.5 years
10.	Bio-processing of Coal Industrial Effluent and Coal Fines Recovery using Aquatic Plants and Phototrophs	CIMFR-CSIR, Dhanbad	36.85	1.5 years
11.	Design and Development of 5m Long Single Phase HTS Cable	IIT, Kharagpur	51.21	1.5 years
12.	Development of Electricity Based Clean and Efficient Cooking Technology Suitable for Indian Cookware	IIT Kharagpur	36.21	1.5 years
13.	Design and development of tools for detection and prevention of cyber-attacks in smart grid energy management systems (EMS)	IIT Bhubaneshwar	49.92	1.5 years
14.	Computational feasibility studies on the development of high temperature superconducting magnetic energy storage (SMES) systems	Lovely Professional University, Punjab	19.98	1.5 years
15.	Transmission Line Protection in the Presence of Bulk Solar Photo Voltaic Power Plants	IIT, Kharagpur	48.40	1.5 years
16.	Thermoelectric Power Generator for Clean Energy Generation by	IIT, Kanpur	50.00	1.5 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
	Recycling Waste Heat Generated in Power Plant			
17.	The unsteady aerodynamic response in LP turbine blade and its control under part load conditions	IIT Roorkee	38.64	1.5 years
18.	Development of plasma torch for efficient disposal of municipal solid waste	CSIR-Central Mechanical Engineering Research Institute, Durgapur	21.67	1.5 years
19.	Design, operation, and control of distributed generation (DG) integrated unified power quality conditioner (UPQC) in electric grid	IIT, Guwahati	32.28	1.5 years
20.	Design, Implementation and Analysis of Wireless Power Transfer and PV System for Battery Charging of Passenger e-Bus	NIT, Trichy	32.4	1.5 years
21.	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
22.	Design and Development of Efficient Induction Cooker suitable for Vessels of Different Material	NIT, Warangal	14.28	1.5 years
23	High-Flux Solar Simulator (HFSS) for High-Temperature Solar Thermal Research	IIT, Kanpur	60.00	2 years
24	Designing and Tailoring of Hierarchical Graphene Carbon Nanotubes and activated Carbon for High Performance Hybrid Supercapacitor	NIT, Rourkela	54.38	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
25	Development of Metal Nanocomposites for the Enhancement of Efficiency of Solar Cell	NIT, Agartala	16.86	2 years
26	Design Of Cascaded Adaptive Control With O2 And Temperature Data Of Combustion Images For Optimization Of Boiler Combustion Processes In A Thermal Power Plant	Vel. Tech University, Tamil Nadu	29.88	2 years
27	Localized Electricity Generation Through Modular Low Temperature ORC Units	IIT (BHU) Varanasi	48.40	2 years
28	Design and Development of a Screw Drive type Wheeled Snake-like Robot to Access the inaccessible Areas inside the Boiler Tubes and other Enclosures	IIT, Bhubaneswar	38.16	2 years
29	Strengthening studies for performance enhancement of existing transmission line towers	CSIR-SERC, Chennai	48.00	2 years
30	Advanced Frequency Response Analysis Method for Identifying Winding Damage or Deformation in Transformer	IIT, Kharagpur	34.50	2 years
31	Agnostic strategies for cyber – physical attacks quantification and mitigation in power networks	IIT, Kanpur	30.01	1 year
32	Impact Analysis and Mitigation of Cyber Attacks on Microgrid SCADA	IIT, Roorkee	42.50	1 year
33	Study on Detection of False Data Injection (FDI) Attacks in Smart Grid Cyber-Physical Systems: A Machine Learning Approach	IIT, Ropar	14.16	1 year
34	Cyber Security of Power Systems	IIT,	48.74	1 year

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
	through Design-for-Prevention, Real-time Detection and Effective Intervention	Kharagpur		
35	AI and IoT based Attack Detection and Authentication Scheme for Cyber Security in Grid Connected Power Electronic Converters	IIT, Guwahati	17.78	1 year
36	Cyber-Attack Analysis Toolkit for Cyber-Physical Distribution System Security [CyberDiSS]	IIT Gandhinagar	23.96	1 year
37	Development of a real-time cyber-attack detection module and its hardware-in-loop testing for an integrated power network	IIT (BHU) Varanasi	49.92	1 year
38	Cyber Physical Modelling and Detection of Cyber Attacks in a Wide Area Damping Controller (WADC) for Smart Grids	IIT, Tirupati	47.92	1 year
39	Development of An On-Board Hybrid Charging System For Hilly-Station Performance Light Electric Vehicle	Tezpur University, Assam	31.46	2 year
40	Design and development of wide bandgap semiconductor based three- level neutral-point-clamped converter for single stage grid-connected PV system	IIT, Delhi	48.00	2 years
41	Electrolytic Capacitor Less Six Pulse DC Link Photovoltaic System connected to Grid	IIT (BHU), Varanasi	45.44	2 years
42	Design and Development of Grid Interactive Adaptive Controls for Frequency Regulation from Large Scale PV Systems	IIT, Bhubaneswar	39.16	2 years
43	Development of Single Metal Atom Derived Electrode Materials for Next Generation Hydrogen Production Systems	SRM Institute of Science and Technology, Kattankulathur	32.52	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
44	Development of MXene-Hierarachical transition metal sulfide hybrid nanostructures as electrocatalysts for overall water splitting	Pandit Deendayal Energy University, Gandhinagar	48.49	2 years
45	Development and Validation of Security Solutions against Various Cyber Attacks at Substation/Transmission Level for Indian Power Grid Network	IIT, Roorkee	49.85	1 year
46	Switching based PID control approach for automatic generation control (AGC) of power system with integration of Renewable Energy (RE) sources	IIT, Roorkee	27.04	2 years
47	Investigations in a Modernized Cavitation Channel to Optimize Hydraulic Turbine Operation and Maintenance Issues	IIT, Delhi	49.20	2 years
48	Characterization and Detection of Power System Ambient, Transient and Forced Oscillations Based on Synchrophasor Data Analytics in Indian Context	IIT, Patna	43.68	2 years
49	Development of High Temperature Wear and Corrosion Resistant Graphene Nanoplatelates Reinforced Plasma Sprayed Cr3C2-NiCr composite Coating for thermal power plant	IIT, Patna	30.64	2 years

The following is the summary of the completed RSoP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1	Performance improvement of steam generator through the enhanced hydrophobic surface	IIT, Bhubaneswar	49.98	2 years
2	Development of High-Power and High-Energy Density Solid-State Hybrid-Energy Storage Device	Pondicherry University, Puducherry	59.24	1.5 years
3	High Capacitance (50F to 200F) Graphene Supercapacitors for Storage of Power from Renewable energy Sources	CMET, Thrissur	71.28	1.5 years
4	Design of Fault Tolerance and Reconfiguration Control for Megawatt Power Electronic Converters Fed Variable Speed Pumped Storage Unit	IIT, Roorkee	48.25	1.5 years
5	Day Ahead Solar Power Forecasting for Indian Climatic Zone	Central Power Research Institute, Bengaluru	50	2 years
6	Adaptive protection schemes for micogrids with grid - connected and islanded mode of operation	IIT, Roorkee	30	2 years
7	Erosion-Corrosion Studies on Thermal Sprayed Conventional and Nanostructured Coatings	IIT, Madras	68	2 years
8	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
9	Development of Blue Light Emitting Diode packages	M.S. University of Baroda, Vadodara	49.50	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
10	High performance PFC based LED Drivers working under Stringent AC Supply	Government Engineering College, Bikaner	34.76	2 years
11	Studies to improve the performance of fault location algorithm for multi-location shunt fault in transmission line-A case study of Chhattisgarh state	NIT, Raipur	27	2 years
12	Post Combustion Carbon Capture & Sequestration (CCS) Plant on a Coal Fired Thermal Power Plant – Feasibility Study	RKDF University, Bhopal	38.50	1.5 years

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 (Thermal, Hydro, Transmission, Grid, Distribution & Energy Conservation 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 the MoE. 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 2021-2022, the following is the summary of the ongoing NPP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1.	Development of polymer nano-composites for EHVDC Lines and diagnostics adopting laser induced breakdown spectroscopy (LIBS)	IIT, Madras	268.41	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
2.	Study of photo biological safety of LED lamps and luminaire	CPRI, Bengaluru	400.00	2 years
3.	Establishing Novel Erosive Wear Test Facility for Testing of Materials Used in Hydroturbine Components	IIT, Madras	125.00	2 years
4.	Development of intumescent fire retardant nano-composites for medium voltage cable sheathing applications	The Energy and Resources Institute (TERI), Bengaluru	134.00	2 years
5.	Advanced Multifunctional Asbestos – Free Thermal Insulating Material – A Gizmo For Energy Conservation	CSIR-AMPRI, Bhopal	89.06	2 years
6.	Large Eddy Simulation of Flow Instabilities in Hydraulic Turbines at Off-design Operation	Indian Institute of Technology, Roorkee	448.17	2 years
7.	Composition analysis of different types of pellets/briquettes received from unknown sources (Activity: 8)	SSS-NIBE, Kapurthala	37.00	1 years
8.	Complete heating and emission analysis of raw biomass and pellets during combustion (Activity: 9,10)	SSS-NIBE, Kapurthala	66.00	2.5 years
9.	Complete Ash Analysis of biomass pellets and co- combusted fuels (Activity: 11, 12 and 13)	SSS-NIBE, Kapurthala	270.00	3 years
10.	Research and development on biomass properties/characteristics (Activity: 20 & 30)	PAU, Punjab	61.40	2 years
11.	Characterization and utilization of paddy straw and other agro residues for conversion into pellets for co-firing in	ICAR-CIRCOT,	493.00	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
	thermal power plants (TPP) (Activity No 1,2,3,4,5,6)	Mumbai		

The following is the summary of the completed 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.	Investigation on flow instabilities in draft tube at off-design operation of hydraulic turbines	IIT, Roorkee	175.00	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., Bengaluru	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	IIT, Madras	66.04	2 years
3	Development of Wankel Expander/Compressor based heat pump system for high temperature applications	IIT, Madras	158.12	3 years
4	Highly porous 3 D graphene composites for protecting electronic equipment from electro magnetic interference (EMI)	IIT, Madras	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	IIT, Guwahati	202.92	3 years
2	Low Cost Indoor Occupancy and Climate Monitoring System for Energy Conservation	IIT, Kanpur	88.75	3 years
3	Cognition and Control for Demand Management: Sensors, Actuators and Web Services for Smart Consumers	IIT, Bombay	140.04	3 years

Sl. No.	Title of Project	Organization	Total Sanctioned Cost (Rs. in Lakhs)	Duration
4	Data-Driven modelling, analytics and optimization techniques to manage building thermal demand	IIT, Bombay	202	3 years
5	Power Converter Design and Implementations for Energy Efficient Applications using Wide-Band-gap Power Devices	IIT, Kanpur	184.38	3 years
6	Decentralized Power Generation using Micro Gas Turbines	IIT, Kanpur	398.96	3 years
7	Design, Development and Control of High-Speed Switched Reluctance Generator for Direct-Coupled Operation with Thermal Turbo-Machinery	IISc., Bengaluru	395.00	3 years
8	Development and Application of Small Scale Bending Tests for Residual Property Assessment of High Temperature Materials in Turbines	IISc., Bengaluru	221.52	3 years

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

Dielectric Materials Division

Sl. No.	Title	Sponsoring Organisation	Duration (Start & Close)	Outlay (Rs. in Lakhs)
1.	A Management service for the treatment of transformer mineral oil containing PCBs using the mobile PCB de-chlorination system in India	UNIDO	September 2016 to December 2022	500.00

Energy Efficiency & Renewable Energy Division

Sl. No.	Title	Sponsoring Organization	Duration (Start & Close)	Outlay (INR in Lakhs)
1.	Establishment of LED Luminary Test Facility Across various Locations of India.	BEE	January 2018 to December 2021	1620.00

2.	Establishment of Automated EVSE (AC/DC) Test Facility.	BEE	July 2021 to June 2023	1075.00
3.	Study of Photobiological Effect of LED Lamps and Luminaires.	Ministry of Power (NPP)	April 2019 to March 2022	400.00

Metering & Utility Automation Division

Sl. No.	Title	Sponsoring Organisation	Duration (Start & Close)	Outlay (Rs. in Lakhs)
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 from 22nd April 2020	166.11

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Information on Patents

The following Patents have been filed. The patent details are given below: -

Sl. No.	Patent Title	Patent Application No.	Date of Filing	Inventors Name
1.	"A Reactor For Reducing Energy Penalty in a Solar Thermal Integrated Carbon Capture Plant" filed by RKDF University and CPRI	202121023921	28th May 2021	Dr. Vinod Krishna Sethi India Director General (Research), RKDF University, Bhopal -462 033 and Dr. Sadhna Kapoor India Chancellor RKDF University, Bhopal -462 033
2.	Green Insulating Fluids for Transformer Application: A Non-Edible Vegetable Oil"	202141053865	8th September 2021	Dr. Dhorali Gnanasekaran, Scientific Officer Gr.3, DMD, CPRI, Bengaluru and Dr. Chavidi Venkata Prasad, Scientific Officer Gr.3, RTL, CPRI, Noida

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 2021-22, a total of 60,433 evaluations were conducted on 14,626 samples for 3564 organizations which includes Central, State & Private Power Utilities, domestic and international electrical equipment manufacturers.

CPRI bags ISO/IEC 17065 accreditation

National Accreditation Board for Certification Bodies

NABCB

IAF

Accreditation Certificate

NABCB

hereby confirms that

Central Power Research Institute (CPRI)

Prof. Sir C.V. Raman Road,
Sadashivanagar P.O.,P B No. 8066,
Bangalore - 560080, Karnataka

complies with

NABCB Accreditation Criteria for Certification Bodies
(ISO/IEC 17065:2012)

to carry out

Product Certification

The Scope of Accreditation is described in the accompanying Schedule(s)

Accreditation Certificate No.:		**PC 029**
Date of Initial Accreditation	:	March 24, 2022
Validity of Accreditation	:	March 23, 2025

March 24, 2022
Issue Date

(Rajesh Maheshwari)
Chief Executive Officer

(Please refer **http://nabcb.qci.org.in** for validity of the certificate or contact NABCB for any related queries)

Page 1 of 1

Accreditation for Product Certification

The export footprint for electrical equipment manufactured in India is set to rise, with an important bottleneck being addressed by CPRI. The Central Power Research Institute (CPRI) an autonomous Society under the Union Ministry of Power, Government of India, has been granted the prestigious Accreditation by National Accreditation Board for Certifying Bodies (NABCB) - MEMBER OF INTERNATIONAL LABORATORY ACCREDITATION COOPERATION (ILAC) & INTERNATIONAL ACCREDITATION FORUM (IAF) for Product Certification of Electrical Equipment as per ISO/IEC 17065.

This accreditation means that Indian Manufacturers/Customers who have obtained Test Certificates from CPRI would be able to Export their Products without the requirements of retesting or authentication by any other body.

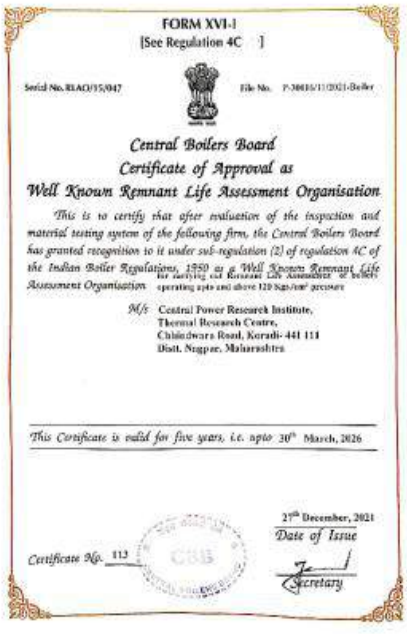
This accreditation will also aid its International Customers /Manufacturers who obtain their Product Certification from CPRI to participate/compete in the Global Market.

CPRI is accredited to carry out Product Certification covering a wide range of Electrical Equipment. The detailed Scope of accreditation is available in the link of CPRI Website below:

https://cpri.res.in/accreditations-recognition

Certificate of Approval as "Well Known Remnant Life Assessment Organization"

The Committee of Central Boiler Board (CBB) visited CPRI, TRC, Nagpur for evaluation of inspection and material testing system, on 10th December 2021. CPRI, TRC, Nagpur received the Recognition of "Well Known Remnant Life Assessment Organization" with validity upto 30th March 2026.



FORM XVI-I

[See Regulation 4C]

Central Boilers Board

Certificate of Approval as

Well Known Remnant Life Assessment Organisation

This is to certify that after evaluation of the inspection and material testing system of the following firm, the Central Boilers Board has granted recognition to it under sub-regulation (2) of regulation 4C of the Indian Boiler Regulations, 1950 as a Well Known Remnant Life Assessment Organisation

M/s Central Power Research Institute,
Thermal Research Centre,
Chhindwara Road, Koradi- 441 111
Distt. Nagpur, Maharashtra

This Certificate is valid for five years, i.e. upto 30th March, 2026

27th December, 2021
Date of Issue

Certificate No. 113

Secretary

First –time Tests

Capacitors Division (CD)

OVER VOLTAGE TEST AT -40°C

- Testing and evaluation of HV Shunt capacitor of rating 110kvar, 3.8kV, Internal fuse type as per IEEE Std.18-2012 for Performance test at minus 40°C was carried out for the first time in Capacitors Division. The manufacturer was successful in completing the test as the materials used have withstood minus 40°C.

Arrangement for Over Voltage Test on 110kvar, 3.608kV, Internal HV capacitor

Testing and Evaluation of 36 kV, 2000A, 31.5 kA, Outdoor VCB

- Environmental cycle test as per specific customer requirements was carried out on 36 kV, 2000A, 31.5 kA, Outdoor VCB. The requirement was for conducting the test by cycling the temperature between 20℃ to 50℃ and maintaining relative humidity above 90% and also to load the VCB with current during the above environmental cycle. The pre-defined cycle were to be carried out as per specific customer requirements and a number of repetitive cycles were to be carried out. This was the first time the test was performed in CPRI.

A view of the tested 36 kV, 2000A, 31.5 kA, Outdoor VCB

Cables & Diagnostics Division (CDD)

- Type Test on 1C X 2500 Sqmm, 400 kV Cable System as per IEC: 62067.

Type Test on 1C X 2500 Sqmm, 400 kV Cable System as per IEC: 62067

High Voltage Division (HVD)

- Impulse test on Inter Turn Insulation of 11kV Motor Coil.

Impulse test on Inter turn Insulation of 11kV Motor Coil

Short Circuit (SC) Lab

- Accuracy test on 220kV (ratio: 220kV/√3:110/ √3, 10VA, 0.2 class) Inductive Voltage Transformer as per IEC 61869-3:2011.

Accuracy test on 220kV (ratio: 220kV/√3:110/ √3, 10VA, 0.2 class) Inductive Voltage Transformer

STDS, Bhopal

- Type Tests as per IS15884: 2010 on Three phase Prepaid meter, Utilization category UC3 with Annexure – G.

UHVRL, Hyderabad

- Critical Impulse Flashover test on 525 kV, Porcelain Solid Care Post Insulator as per ANSI C29.9-2017 standard.

Critical Impulse Flashover test on 525 kV, Porcelain Solid Care Post Insulator

New Test Facilities Created

Capacitors Division (CD)

Testing and Evaluation of APFC panel of Highest rating: 800 kvar, 440V, 3Ø

Power Factor correction (PFC) Panel of rating 800 kvar, 440V was tested as per IS 16636:2017 and customer requirements and it is the highest rating of APFC panel ever tested in any laboratory in the Country.

A view of the tested 3Ø, 440V, 800 kvar LV APFC Panel

Cables & Diagnostics Division (CDD)

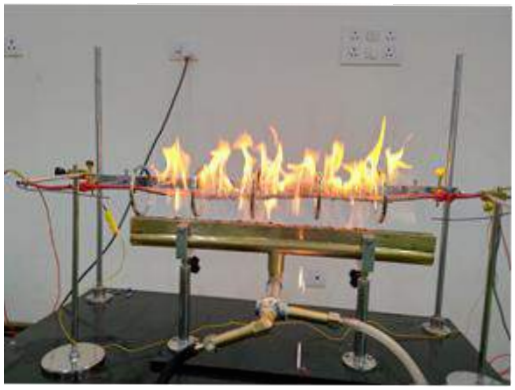
- **Fluorine Content Test**

  Halogen Free Flame Retardant (HFFR) Cables for Working Voltages up to and including 1100 Volts as per IS 17048 are made of halogen free flame retardant compounds and the Fluorine Content test apparatus as per IS 17048 & IEC 60684-2 is used to measure the quantity of fluorine present in the Halogen Free Fire Retardant Sheathing and Insulating materials of power cables.

Fluorine Content test apparatus

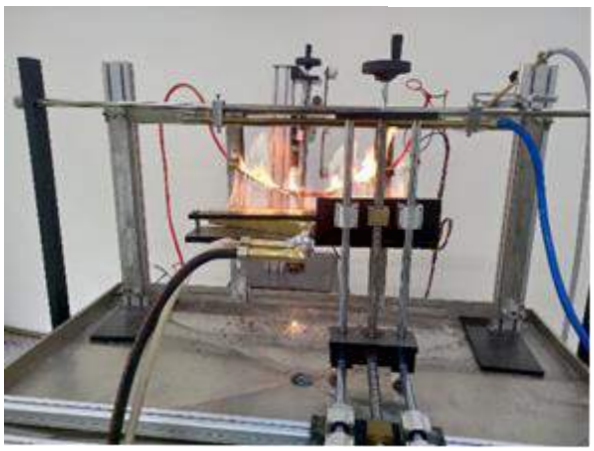
- **Fire Resistance tests**

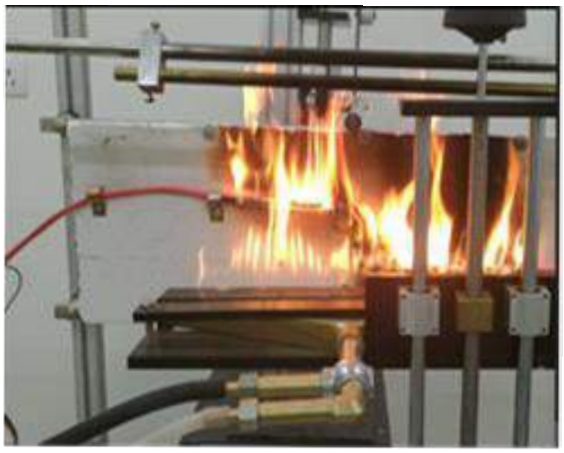
The fire resistance test facilities are used to check the resistance to fire of cables of rated voltage not exceeding 600/1000 V to maintain circuit integrity under fire conditions. The different categories of the fire resistance tests are Resistance to Fire Alone (Category C), Resistance to Fire with water (Category W), Resistance to Fire with mechanical shock (Category Z) and Resistance to Fire, Water & Mechanical shock. The applicable standards for the fire resistance tests are BS 6387, BS EN 50200, IEC 60331-21, IS 17505 (Part 1), BS 8491, IEC 60331-1 /2018, IEC 60331-2 / 2018 & IEC 60331-3 /2018.



Resistance to Fire Alone test

Resistance to Fire with water





Resistance to Fire with mechanical shock

Electrical Appliances Technology Division (EATD)

- Augmented Ingress protection (IP) test laboratory with state-of-the-art equipment to perform IP testing ranging from single degree protection (1st characteristic numeral) IP 1X to 6X, (2nd characteristic numeral) IP X1 to X9 and two-degree protection ranging from IP 11 to IP 69 tests has been established. The Laboratory is fully operational for Utilities and Customers to utilize the services.

Dust chamber to accommodate DUT of size upto 4.5*4*4m (WDH)

DUT in dust test chamber after IP 5X test

IP X1 and X2 test device

IP X3, X4, X5 and X6 test device with an auto movement of test nozzles

 IPX9 test in progress, with high temperature and pressure.	 IP X4 test in progress with an auto movement of test nozzles

Materials Technology Division (MTD)

Digital Ultrasonic Flaw Detector:

The addition of this facility is useful in field consultancy work to detect any flaws present or developed during service in the engineering components.

Digital Ultrasonic Flaw Detector

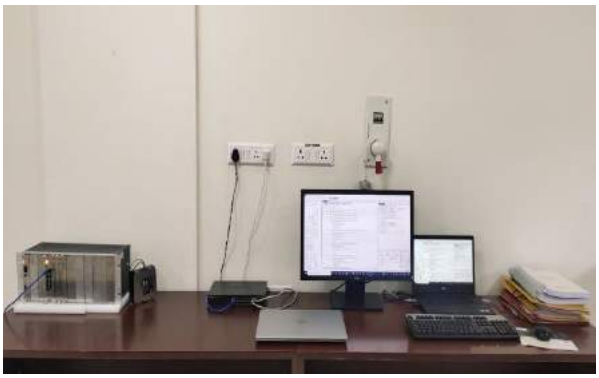
Metering & Utility Automation Division (MUAD)

Now a days, Power Utilities are using communication devices in their network for the controlling and monitoring of equipment installed in electrical network. The use of these communication devices ease the process of monitoring and provide better management for Utilities. However, these communication devices may be vulnerable to the cyber-attacks and requires cyber security conformation to mitigate these challenges.

To address above issues, CPRI has established the following new test facilities under Capital project at Substation Automation System Laboratory (SASL),

Metering and Utility Automation Division, CPRI, Bengaluru for the communication devices used in the Power System Network:

a. Communication protocol conformance testing for Remote Terminal Unit (RTU) & Feeder Remote Terminal Unit (FRTU) as per IEC 60870-5-104 & IEC 60870-5-101 standards
b. Security implementation testing for Remote Terminal Unit (RTU) & Feeder Remote Terminal Unit (FRTU) as per IEC 60870-5-7 (Including IEC 62351).



Security Implementation Test Facility at SASL, MUAD, CPRI, Bengaluru

- Substation Automation System Laboratory, Metering and Utility Automation Division, CPRI, Bengaluru has successfully completed the Security implementation testing for 2 Nos of Remote Terminal Units (RTUs) based on IEC 60870-5-101 & IEC 60870-5-104 communication protocols.

Handing over of first security implementation test report to client

- CPRI has also established the SCADA Lab as a part of Smart Grid Research Laboratory under capital project. In this Lab, Utility's SCADA Control Centre Vulnerability Assessment and Penetration Test (VAPT) can be conducted in emulated mode.

SCADA Laboratory

UHVRL, Hyderabad

- Electrical & Photometric test facility for self-ballasted LED Lamps & Luminaries established as per IS 16102 & IS 16106 standards.

Augmentation of Laboratory

Special Tests Conducted

Capacitors Division

Testing and evaluation of HV Shunt capacitors of various ratings ranging from 110kvar, 3.608kV to 1032.6kvar, 12.025k HT Shunt Capacitor unit and Series capacitor of rating 949.81kvar, 6.944kV from various organizations as per national and international standards and industry protocols. About 60 capacitors have been tested for various tests.

Testing and evaluation of 864kvar, 4.84kV Internal fuse HT Shunt capacitor was the highest voltage rating tested as per IEC 60871-1-2014. Photographs of some of the tests are shown below:

	
Arrangement for Thermal Stability Test on 1032kvar 12.025kV, Int.Fuse capacitor unit	**Test arrangement for Lightning Impulse voltage test 850kvar 12.5kV, Int.Fuse Capacitor unit**

- **HV Series Capacitors**

  Testing and evaluation of 949.81kvar, 6.944kV Internal fuse HT Series capacitors-3 Nos. was the highest voltage rating tested as per IEEE Std.824-2012. Photographs of some of the tests are shown below:

Arrangement for Short Circuit Discharge test 949.81kvar, 6.944kV, Internal Fuse Capacitor unit

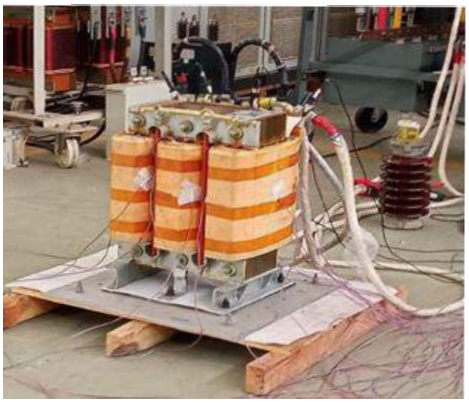
- **Testing and Evaluation of Line Trap of rating 1.0 mH, 2000 A**

Temperature rise tests on 1.0 mH, 2000 A, Line trap as per IEC 60353 was carried out and it was the highest rating of Line trap tested.

A view of the line-trap test in the Laboratory

- **Testing and Evaluation of Iron Core Inductor used in Rolling Stock Application**

The type tests were performed on 1.3 mH, 3-Phase, 385 A, Iron core Inductors and 1.5 mH, 1-phase, 650 A Iron core inductor used in rolling stock application, in accordance with IEC 60310: 2016 and as per customer's requirements. These inductors are a series inductor used in filter application in the rolling stock.



A view of the 3 phase 1.3 mH, 385A, Inductor

A view of the 1 phase 1.5 mH, 650A, Inductor

- **Testing and Evaluation of Discharge Resistor for Capacitor banks in Electric Locomotives**

  The Discharge Resistor used in discharging Capacitor banks of Electric Locomotives were tested for maximum voltage stress test as per customer protocols, wherein a charged Capacitor bank is dischaged through the resistor and the discharge current wavefrom is recorded.

A view of the discharge resistor

- **Environmental testing of gravimetric Remote Control Panels (RCP) and Local Control Panels (LCP)**

  The environmental test included performing Cold test, Dry heat test and Damp heat cycle tests in accordance with various parts of IEC 60068 and as per customer. These panels were tested as per the requirement of the customer.

A view of the Panels undergoing environmental test

- **Testing of 137/√3 kV(79.1kV), 17400pF Model Capacitor used in the CVT**

The determination of the temperature coefficient test on this model Capacitor was carried out as per customer requirements and IEC 60358-1990 in the temperature range -25ºC to +80ºC.

A view of the test setup for model Capacitor

Cables & Diagnostics Division (CDD)

- Pre-Commissioning tests on 1 x 1000 Sq.mm 66kV XLPE Cable System.
- Pre-Commissioning tests on 1 X 240 Sq.mm 66 kV XLPE Cable System.

Earthquake Engineering & Vibration Research Centre (EVRC)

- Seismic qualification test on 132 kV, 2000A Disconnector.

Seismic qualification test on 132 kV, 2000A Disconnector

- Seismic qualification test on 245kV Current Transformer.
- Vibration testing of Local control panel and Remote control panel of coal feeder.

Vibration testing of Local control panel and Remote Control Panel of Coal Feeder

High Power Laboratory (HPL)

- Dynamic ability to withstand short circuit test on 53.33 MVA, 220/√3/132/√3/33 kV single-phase Transformer.

Dynamic ability to withstand short circuit test on 53.33 MVA, 220/√3/132/√3/33 kV single-phase Transformer

- Internal arc test on 6.6/11kV PS Terminal Box.

Internal Arc test on 6.6/11kV PS Terminal Box

Short Circuit Laboratory

- Verification of short circuit withstand strength at 40kA for 1 s with 84 kA peak on main bus bars, neutral and earth bus bars and other verification tests (Temperature-rise, Dielectric properties, Mechanical operation, Lifting, Marking, Clearances & Creepage distances, Resistance to abnormal heat and fire due to internal electric effects etc.) on 500V 400A 6 Way LV Feeder Pillar as per IEC 61439-1: 2020 & IEC 61439-2:2020.

Short circuit withstand test on 500V 400A 6 Way LV Feeder Pillar

:

STDS, Bhopal

- Ability to withstand the dynamic effects of short circuit test on 50400/63000kVA, 132/33kV, Three Phase Power Transformer.

- Ability to withstand the dynamic effects of short circuit test on 12500 kVA, 33/(0.630-0.630-0.630-0.630) kV, Multiwinding Inverter Duty Transformer.

- Short-time withstand current & peak withstand current tests on 400kV, 3150Amps, 50kA, Pantograph Disconnector.

- Ability to withstand the dynamic effects of short circuit test on 2556kVA, 22.5/(0.858 x 4 - 0.343 x 2)kV, Traction EMU Transformer.

- Ability to withstand the dynamic effects of short circuit test on 6810kVA, 22/0.760 kV, 3 Phase, Cast Resin Dry Type Transformer.

- High Current and Low Current Short circuit test on 72 kV, 10kA, Lightning Arrester.

Testing & Certification for Overseas Customers

Capacitors Division

- Testing and Evaluation of LV Shunt Capacitor of rating 30kvar, 440V , 3 Ø, 50 Hz, MPP type and 30kvar, 525V , 3 Ø, 50 Hz, MPP type for M/s. Electrical Components Sdn. Bhd, Malaysia.

A view of the tested 30kvar, 440V, 3Ø, MPP Type LV Shunt Capacitor

Cables & Diagnostics Division (CDD)

- Type testing on 1 x 630 Sq.mm, 0.6/1 kV, PVC Insulated, PVC Cable as per IEC 60502-1 for M/s. RR Imperial Electricals Ltd., Dhaka.

- Type testing on 6/10 (12 kV), 3CX185 Sq.mm, XLPE insulated, PVC Sheathed Cable as per IEC 60502-2 for M/s. SQ Wire & Cable Co. Ltd., Bangladesh.

- Type testing on 3CX400 mm^2, Copper Conductor, XLPE insulated, PVC Inner Sheathed, PE outer sheathed 19/33 kV Cable as per IEC 60502-2 for M/s. Dubai Cable Company, Dubai.

- Dissipation factor measurement on 1500 kVA, 22/0.433 kV, three phase transformer as per IEC 60076-1 for M/s. SGB MY SDN BHD, Malaysia.

- Type testing on 3CX 300 Sq.mm, Cu/XLPE/SWA/PE Cable as per IEC 60502-2 for M/s. Jeddah Cable Company, Jeddah.

- Remote/Virtual witnessing of Type testing on 3CX400 mm^2, Copper Conductor, XLPE insulated, PVC Inner Sheathed, PE outer sheathed 19/33 kV Cable as per IEC 60502-2 for M/s. Dubai Cable Company, Dubai.

Water Penetration test on 3C X 400 Sq.mm, 19/33 kV XLPE Cable

- Remote/Virtual witnessing of Type testing on 1CX630 mm^2, Copper Conductor, XLPE insulated, 1.1 kV Cable as per IEC 60502-1 for M/s. Dubai Cable Company, Dubai.
- Remote/Virtual witnessing of Type testing on 4CX300 Sq.mm, Cu/XLPE/SWA/PVC Cable as per IEC 60502-1 for M/s. Riyadh Cables Group, Riyadh.

Remote/Virtual witnessing of Type testing on 4CX 300 Sq.mm, Cu/XLPE/SWA/PVC Cable

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.
- Inverter testing as per IS 16169/ IEC 62116 and IS/IEC 61727 for M/s. Shenzhen Growatt New Energy Technology Co. Ltd., China.

Earthquake Engineering & Vibration Research Centre (EVRC)

- Seismic qualification tests on 630A Aluminium Busduct, 700A Copper Busduct, 5000A Aluminium Busduct and 5000A Copper Busduct for M/s. Lectro EL Habachi for Electrical Products Co., Alexandria, Egypt.

- Vibration, shock, bump and seismic tests on Electromechanical Auxiliary Relay for M/s. ABB Power Grids Sweden AB, Vasteras, Sweden.

Vibration, Shock, Bump and Seismic tests on Electromechanical Auxiliary Relay

High Power Laboratory (HPL)

- Dynamic ability to withstand short circuit test on 16/20MVA, 33/11.3 kV three-phase Transformer for M/s. Energypac Ltd., Dhaka, Bangladesh.

Dynamic ability to withstand short circuit test on 16/20MVA, 33/11.3 kV three-phase Transformer

- Dynamic ability to withstand short circuit test on 1000 kVA, 6.6/0.433 kV, three phase Transformer for M/s. SGB Sdn. Bhd., Malaysia.

High Voltage Division

- Lightning Impulse voltage withstand Test, Dry & wet Switching Impulse Voltage withstand Test, Dry & Wet and Power Frequency Voltage withstand Tests on

132kV / 23L VMCC FRP Composite Cross Arm consisting of 1 X 10 Nos. of 80kN Disc Insulators for M/s. VSD Automation Sdn Bhd, Malaysia.

Lightning Impulse voltage withstand Test, Dry & wet Switching Impulse Voltage withstand Test, Dry & Wet and Power Frequency Voltage withstand Tests on 132kV /23L VMCC FRP Composite Cross Arm

- Lightning Impulse Voltage Test (Dry) on 12kV Current & Potential Transformer for M/s. Energypac Engineering Limited, Dhaka.

- 1000 hours Tracking and Erosion Test on 38KV Solid Insulated Recloser for M/s. Entec Electric & Electronics Co., Korea.

- Lightning Impulse Voltage Test on Distribution Transformer for M/s. Navana Electronics Limited, Gazipur, Dhaka, M/s. SGB My Sdn Bhd, Malaysia, M/s. Electro Mechanical Automation & Engineering (P) Ltd., Dhaka, Bangladesh and M/s. Lebanese Electrical Services, Lebanon.

- Lightning Impulse voltage withstand & Flashover Test (Dry), Power Frequency Voltage withstand & Flashover Test (Wet), Power Frequency Voltage withstand Test (Dry), Radio Interference Test and Corona Tests on 132kV & 220kV Insulator Strings for M/s. Ceylex Engineering (P) Ltd., Colombo, Srilanka.

Short Circuit (SC) Lab

- Ability to withstand the dynamic effects of short circuit, Thermal ability to withstand short circuit & Temperature Rise tests on 200kVA 11000/415V & 250kVA 11000/415V Three Phase Distribution Transformers as per IEC 60076 - 5: 2006 & IEC 60076-2: 2011 for M/s. Navana Electronics Ltd., Bangladesh.

Ability to withstand the dynamic effects of short circuit, Thermal ability to withstand short circuit & Temperature Rise tests on 200kVA 11000/415V & 250kVA 11000/415V Three Phase Distribution Transformers

- Temperature-rise and Determination of sound level tests on 1500kVA 22000/433V Three Phase Oil Immersed Distribution Transformer as per IEC 60076- 2:2011 & IEC 60076-10:2016 for M/s. SGB MY Sdn. Bhd., Malaysia.

Temperature-rise and Determination of sound level tests on 1500kVA 22000/433V Three Phase Oil Immersed Distribution Transformer

- Short-time withstand current test and peak withstand current tests at 26.3kA rms for 3s with 65.75 kA peak on main circuit of 12kV 630A Indoor Air Insulated Metal Enclosed Switchgear as per IEC 62271-200:2011 for M/s. ABB Malaysia Sdn. Bhd., Malaysia.

Short-time withstand current test and peak withstand current tests at 26.3kA rms for 3s with 65.75 kA peak on main circuit of 12kV 630A Indoor Air Insulated Metal Enclosed Switchgear

- Temperature-rise, Determination of sound level, Measurement of zero-sequence impedance and Measurement of no-load loss and current at 90% & 110% of rated voltage tests on 1000kVA 6600/433V Three Phase Oil Immersed Distribution Transformer as per IEC 60076-2:2011, IEC 60076-10:2016 & IEC60076-1:2011 for M/s. SGB MY Sdn. Bhd, Malaysia.

Temperature-rise, Determination of sound level, Measurement of zero-sequence Impedance and Measurement of no-load loss and current at 90% & 110% of rated voltage tests on 1000kVA 6600/433V Three Phase Oil Immersed Distribution Transformer

- Ability to withstand the dynamic effects of Short Circuit & Temperature Rise tests on 200kVA 11000/415V & 250kVA 11000/415V Three Phase Distribution Transformers as per IEC 60076 - 5: 2006 & IEC 60076-2: 2011 for M/s. Electromech Automation Limited, Dhaka, Bangladesh

Ability to withstand the dynamic effects of Short Circuit & Temperature Rise tests on 200kVA 11000/415V & 250kVA 11000/415V Three Phase Distribution Transformers

- Thermal short circuit test at 20kA rms for 1 second through screen & armour on 3 x 240 sq.mm Copper conductor, XLPE insulated PVC sheathed 18/30kV Cable with accessories (heat shrink indoor termination, outdoor termination and a straight through joint) for M/s. El-Masalla Co. for Industrialization of Cable Accessories (EMICA) S.A.E, Cairo, Egypt

Thermal short circuit test at 20kA rms for 1 second through screen & armour on 3 x 240 sq.mm Copper conductor, XLPE insulated PVC sheathed 18/30kV Cable with accessories (Heat Shrink Indoor Termination, Outdoor Termination and a straight through joint)

UHVRL, Hyderabad

- Dry Lightning Impulse Voltage withstand test & Wet Power Frequency Voltage withstand tests on 132 kV & 275 kV composite cross arm of M/s. ELECTRIUS SDN BHD, Malaysia.

	
275 kV composite cross arm	132 kV composite cross arm

- Lightning Impulse Voltage withstand test, RIV, Accuracy test, Tan delta test & Power Frequency Voltage withstand tests on 145 kV Potential Transformer for M/s. Energypac Engineering Ltd., Dhaka, Bangladesh.

TESTING & CERTIFICATION UNDER UL (Underwriters Laboratories):-

- Testing and Evaluation of LV Shunt Capacitor of rating 50kvar, 525V, 3 Ø, 50 Hz, MPP type for M/s. UL (Underwriters' Laboratories), Dubai.

A view of the tested 50kvar, 525V, 3 Ø, 50 Hz, MPP type LV Capacitor after completion of Destruction test

- Short time withstand current at 14.4kA rms for 1s and contact resistance Measurement tests on 800V 269A Terminal Blocks as per IEC 60947-7-1.

- Short time withstand current at 470A rms for 4s on Copper Pigtails (12 AWG) Insulated Copper conductor as per UL 467 standard.

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 2021-22 are provided in Appendix-8.**

Section 4

Consultancy Activities

CONSULTANCY ACTIVITIES

Special Consultancy Activities

Capacitors Division

- Diagnosis and condition monitoring of 245 kV, GIS Circuit Breakers was carried out at site in M/s. NHPC, Teesta Lower dam-3 power station, Rambi, West Bengal. This was the first time CPRI has undertaken testing of the 245 kV GIS circuit breakers at site. A total of six 3 phase 245 kV, 2000A, GIS breaker was taken up at site.
  The uniqueness of the test was that the diagnosis and condition monitoring were performed with opening the GIS breaker by gaining access to the HV terminals of the GIS by a unique method.

A view of the test undertaken on the 3 phase 245 kV, 2000A, GIS Breaker

Cables & Diagnostics Division (CDD)

- I on Generator Transformers for M/s. KSEB, Idukki Hydro Electric Project, Moolamattom
- Condition Monitoring/Diagnostic tests (RLA Studies) on Transformers for M/s. KPCL, RTPS
- Diagnostic Tests on Generator Transformers, Tests on CTs, Diagnostic Tests on Generators for M/s. NEEPCO, Doyang, Nagaland
- Diagnostic Tests on Transformers & Las for NHPC, CPS-III

Energy Efficiency & Renewable Energy Division (ERED)

- Comprehensive Energy Audit of M/s. NEEPCO Hydro Power Station

- Net Head Measurement Study at M/s. NHPC Chamera-II and Chamera-III Hydro Power Station, Himachal Pradesh at field
- Energy audit at SRLDC, POSOCO building, Bangalore
- Field Efficiency Test at Kishanganga Power Station, NHPC, J&K.

High Voltage Division

- Evaluation of earthing system for Indraprastha 220kV substation for M/s. DTL, New Delhi
- Earth Healthiness study for M/s. Nathpa Jhakri Hydro Power Plant for M/s. SJVN, Jhakri
- Measurement of Earth Resistance at Rampur Hydro Electric Power Station for M/s. SJVN, Rampur
- Earthing System study at 1000 MW Bhadla Solar Park for M/s. Saurya Urja Company of Rajasthan Ltd, Bhadla
- Pollution mapping study at Dadri-Kurja, for M/s. L&T, Noida
- Soil resistivity measurements at Naval Base Station for M/s. BEL, Karwar
- Earthing Audit at RTPS, KPCL, Raichur
- Earthing Audit study at 400kV Meramundali Substation for M/s. OPTCL, Bhubaneswar
- Earthing System study for automation system at RIL Hazira and RIL Dahej for M/s. ABB, Bangalore

Materials Technology Division

- Corrosion mapping of boiler water wall tubes of Unit # 4, M/s. NTPC Limited, Farakka Super Thermal Power Station (FSTPS), Farakka
- Oxide layer thickness measurement of super heater boiler tubes of Unit # 2, M/s. Haryana Power Generation Corporation Limited (HPGCL), Panipat Thermal Power Station (PTPS), Panipat
- Diagnostic studies (Mechanical) of Generator Rotor of Gas Turbine for M/s. NEEPCO, Assam Gas Based Power Project, Dibrugarh
- Root Cause Analysis for the failure of main steam stop valve stem rod of 660MW SC boiler for M/s. Sembcorp Energy India Ltd, Nellore.

Mechanical Engineering Division (MED)

- Vetting/Checking the Design Calculation & Single Line Drawing of 132 kV D/C Type “NBDA (0^O-2^O)” (ACSR Panther) (Wind Zone-4, 5), NBDB (2^O-15^O)” (ACSR Panther) (Wind Zone-5) and NBDC (15^O-30^O)” (ACSR Panther) (Wind Zone-5) Tower with +3M, +6M & +9M Body Extensions for M/s. Transrail Lighting Limited, Nagpur.

- Vetting/Checking the foundation for 400 kV D/C Tension Pole type "PC+0(15-30Deg)" body extensions at location no 66_1.5m, type "PB+3(2-15Deg)" location no 61_2.22m and "PD+3(30-60Deg)/DE" at location no 69_2.43m at RC (Musi River) for M/s. TS TRANSCO, Hyderabad.

- Vetting/Checking the Pile Foundation Design Calculations & drawing of 132 kV D/C Type “DD+18” River Crossing Tower at Kosi River in Saharsa District of M/s. Secure Structure Consultancy, Patna.

- Design checking/approval of 400 kV D/C Type “2DBL S1 (0-15)” & DB (0-15)” (Quad AAAC Moose) (Wind Zone-2) towers with basic tower +3m leg & +6m body extensions of M/s. Sterlite Power Transmission Ltd., New Delhi.

- Design Checking of Construction of 132 kV Transmission Line with ACSR panther Conductor- Comparison of load calculations of 220 kV M/C (Originally designed for 220 kV line with ACSR Moose conductor for 250 M ruling span) tower with proposed 132 kV M/C tower with ACSR Panther conductor for 300 m ruling span for M/s. North Central Railways, Allahabad Division for M/s. K Ramachandra Rao, Hyderabad.

Metering & Utility Automation Division

- Completed SCADA and DMS consultancy project for M/s. Puducherry Electricity Department under R-APDRP Scheme.

- Smart Grid consultancy project for M/s. Telangana State Southern Power Distribution Company Limited (TSSPDCL) under R-APDRP Scheme of pilot smart grid projects.

Power System Division (PSD)

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

- Fault analysis or Root cause analysis of 125 MVA Power Transformer at 1000MW Solar Park Bhadla-III for M/s. Saurya Urja Company of Rajasthan Limited, Jaipur.

- Third party protection audit for Substations of WRTS-I, M/s. Power Grid Corporation of India Ltd., Nagpur.

- On field testing & calibration of Numerical Protection Relays for M/s. NHPC Ltd., Chutak Power Station, Kargil (UT of Ladakh).

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

- Third Party Protection Audit for Substations of WRTS-II, M/s. Power Grid Corporation of India Ltd., Vadodara

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

- Study and Third Party Protection Audit for M/s. RGTPP, Ramgarh

- Third party protection audit for substation of M/s. Bhopal Dhule Transmission Company Limited, Dhule.

Ultra High Voltage Research Laboratory (UHVRL), Hyderabad

- Onsite measurement of ground level DC Electric field measurement at ± 800 kV, HVDC Terminal Station for M/s. Power Grid Corporation of India Ltd., Biswanath Charali

DC Electric field measurement at ± 800 kV, HVDC Terminal Station of M/s. Power Grid Corporation of India Ltd., Biswanath Charali

- Onsite measurement of ground level DC Electric field at ± 800 kV, 6000 MW HVDC Terminal Station for M/s. Power Grid Corporation of India Ltd., Pugalur,

DC Electric Field Measurement at M/s. Power Grid Corporation of India Ltd., Pugalur

- Onsite Radio Interference Voltage Measurement (RIV) of 2X250 MW for M/s. Powergrid Corporation of India Ltd. (PGCIL), HVDC BTB Station at Vindhyachal

UHVRL Team along with M/s. Siemens site official and M/s. PGCIL Official at 2X250 MW HVDC BTB Station, Vindhyachal

- DC filed measurements of +/- 800 kV HVDC for M/s. Powergrid Corporation of India Ltd., Champa

DC Field measurement at +/- 800 kV HVDC PGCIL Station, Champa

Section 5

Promotional Activities

PROMOTIONAL ACTIVITIES

Important Conferences/Webinars/Training Programmes Organised

1) One day online workshop on “Protection Audit” organized for the officers of M/s. SKTPS, Kota, held at CPRI, Bangalore, on 2nd April 2021.

2) Training Programme on “Non-Destructive and Destructive Testing of boiler components of Thermal Power Plant”, held at M/s. Khaperkheda Thermal Power Station, Khaperkheda, on 1st July 2021.

3) Webinar on “Methodologies of Temperature Rise Tests on Low Voltage Switchgear and Controlgear Assemblies as per IEC 61439-1:2020”, held on 26th October 2021.

4) Workshop on “Remaining Life Assessment of Turbine-Generator shafts of Hydro plants”, held at M/s. Bhakra -Nangal Left Bank Power House, on 8th December 2021.

5) Two days online Training Programme on “Cyber Security for Hydro Power Plants” for Officers and Executives of M/s. NHPC, Chandigarh, held at CPRI, Bengaluru, on 10th & 11th February 2022.

6) Webinar on "Emerging Trends and Challenges in Transformer Technology", held on 24th March 2022.

7) Training program on “Energy Audit of Hydro Power Station” conducted at Kishanganga Power Station, NHPC, Bandipora, on 31st March 2022.

8) Webinar on “Latest IEC 62271 Series of Standards: Considerations for Temperature Rise Test on High Voltage Switchgear and Control Gear Equipment”, held on 4th March 2022.

9) National Conference on “High Voltage Engineering and Technology”- NCHVET 2022”, held online on 25th February 2022.

10) Webinar on “Importance of transformer oil testing in preventive maintenance of transformers”, held at UHVRL, CPRI, Hyderabad, on 25th March 2022.

Awards & Accolades

- Shri. Jeykishan Kumar K, Engineering Officer Gr.1, CPRI, Bengaluru was awarded International Golden Research Award for the contribution towards the field of Grid Connected Solar Photovoltaic System by the board of ISSN International Awards for Outstanding Achievement in Research and Academia powered by the World Research Council, on 15th August 2021.

- The paper titled "Study of Transient Enclosure Voltage in Hybrid MV Switchgear", presented at SWICON 2021, 10th International Conference on Switchgear and Controlgear, conducted virtually from 16th to 18th November 2021 won the best paper award for Shri Sreeram V, Engineering Officer Gr.2, CPRI, Bengaluru.

- Shri. Sreeram V, Engineering Officer Gr.2, CPRI, Bengaluru was shortlisted for Paul A Chatterton Young Investigator award at the 29th International Symposium on Discharges and Electrical Insulation in Vacuum (ISDEIV), held at Padova, Italy.

- Technical paper titled “Impact of Common Defects in Silicone Composite Long rod Insulators on Radio Frequency Interference Spectra” authored by P. Rajamani, K. A Aravind, Dr. Pradeep M. Nirgude presented at ‘First International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT-2022)’ organized by K. Ramakrishnan College of Engineering, Trichy, from 16th to 18th February 2022 conferred as best paper among the papers presented in the technical session EE03.

- Mrs. J. Sreedevi, Joint Director, CPRI, Bengaluru was awarded Doctorate of Philosophy at the 20th Annual Convocation of Visvesvaraya Technological University (VTU), organized at its headquarters at Jnana Sangama, Belagavi, on 3rd April 2021 for the topic “Performance Analysis of Multi-infeed HVDC Systems”.

Visit of Important Persons/Foreign Delegations to CPRI

Electrical Appliances Technology Division (EATD)

- Director for Electric Mobility, NITI Aayog visited battery testing laboratory of EATD, CPRI, Bengaluru and discussed about advanced Cell Chemistry, testing and training on EV and batteries**,** on 23rd March 2022.

High Voltage Division

- Mr. Shubharambha Bikaram Shah, Project Manager, Nepal Electricity Authority, Nepal visited High Voltage Division, CPRI, Bengaluru for witnessing 220kV Tension Insulator String Test and Line accessories, on 29th & 30th November 2021.

- Engr. Sk. Munir Ahmed, Director (Management), Power Cell, Power Division, Ministry of Power, Energy & Mineral Resources, Bangladesh and Mr. MD Yeasin Arafath, Sub - Divisional Engineer, Power Grid Company of Bangladesh Ltd., Bangladesh, visited High Voltage Division, CPRI, Bengaluru for witnessing the Acceptance Test on Disc Insulators on 18th January 2022.

Short Circuit Laboratory

- Mr. Ganesh Gopalakrishnan, GM - Engg from M/s. Dorman Smith Switchgear LLC, visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Verification of short circuit withstand strength at 17kA for 0.25 s with 34 kA peak on main bus bars, at 10.2kA for 0.25 s with 20.4 kA peak on neutral and earth bus bars on 415V 160A 12 Way LV Distribution Board as per IEC 61439-1: 2011 & IEC 61439-2:2011 for M/s. Dorman Smith Switchgear LLC, Dubai, UAE, on 30th June 2021.

Verification of short circuit withstand strength at 17kA for 0.25 s with 34 kA peak on main bus bars, at 10.2kA for 0.25 s with 20.4 kA peak on neutral and earth bus bars on 415V 160A 12 Way LV Distribution Board

- Local representative Mr. Nagesh Halale witnessed the tests on behalf of M/s. Alaf Cekal SDN BHD, Darul Ehsan, Malaysia for Verification of short circuit withstand strength test at 31.5kA for 3s with 66.15 kA peak on main bus bars & 18.9 kA for 3s with 37.8 kA peak on neutral bus bar on 400V 1600A Ground mounted LV Metering KIOSK as per IEC 61439-1: 2011 & IEC 61439-5:2014, on 6th August 2021.

Verification of short circuit withstand strength test at 31.5kA for 3s with 66.15 kA peak on main bus bars & 18.9 kA for 3s with 37.8 kA peak on neutral bus bar on 400V 1600A Ground mounted LV Metering KIOSK

- Local representatives Mr. P Karthik & Mr. R. Kathrivel witnessed the tests on behalf of M/s. Satria Technologies SDN BHD, Malaysia for Verification of short circuit withstand strength test at 31.5kA for 3s with 66.15 kA peak on main bus bars & 18.9 kA for 3s with 37.8 kA peak on neutral bus bar on 400V 800A Ground mounted LV Metering KIOSK as per IEC 61439-1: 2011 & IEC 61439-5:2014, on 27th August 2021.

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Verification of short circuit withstand strength test at 31.5kA for 3s with 66.15 kA peak on main bus bars & 18.9 kA for 3s with 37.8 kA peak on neutral bus bar on 400V 800A Ground mounted LV Metering KIOSK

STDS, Bhopal

- Mr. Md. Fuad Moni and Mr. Mohammad Masudur Rahman from M/s. General Electric Manufacturing Company Limited, Bangladesh visited Station-2, STDS, CPRI, Bhopal, for testing purpose, from 14th to 28th February 2022.

- Mr. Girjesh Tiwari, Mr. Mayank Hajela, L&T, Faridabad, Mr. Umesh Mehta (TUV) Surveyor Elect., Mr. C.L. Krishnaiah, Aishwarya Associates Plant Manager witnessed the ability to withstand the dynamic effects of short circuit test on 7940 kVA, 33/(0.800-0.800) kV, Power Transformer (Inverter duty Type) for M/s. Federal Power Transformers L.L.C., Abu Dhabi, U.A.E, on 27th & 28th October, 2021.

- Mr. Bimal Kumar Sarker, GM and Mr. ATM Nazmus Saquib, DM witnessed the Ability to withstand the dynamic effects of short circuit test conducted on (i) 100kVA, 33/0.433 kV, 3-Phase, Station Transformer, (ii) 200kVA, 33/0.433 kV, 3-Phase, Station Transformer and (iii) 10000/14000 kVA, 33/11.55 kV, 3-Phase, Power Transformer for M/s. Techno Venture Ltd., Dhaka, Bangladesh, from 16th to 20th December 2021.

- Mr. Md. Fuad Moni, DCE (Naval), Mr. Md. Masudur Rahman, Engineer (Elec.), Mr. Mir Sirajul Ali witnessed the Ability to withstand the dynamic effects of short circuit test on 200kVA, 11/0.415kV, Three Phase Power Transformer, for M/s. General Electric Manufacturing Company Ltd., Bangladesh, on 22nd February 2022.

- Mr. Mohammad Masudur Rahman, Engineer and Mr. MD Faud Moni, Dy. Chief Engineer (Naval), BSEC, Dhaka, Bangladesh witnessed the Lightning Impulse chopped on tail test conducted on 100 kVA, 200kVA & 250kVA Distribution Transformers for M/s. General Electric Manufacturing Co. Ltd, Dhaka, on 11th February 2022.

Participation in Conferences / Exhibitions

DIGIELEC BHARAT Virtual Exhibition:

CPRI participated in 2nd edition of Digielec Bharat – Virtual Exhibition organized by Indian Electrical & Electronics Manufacturer's Association (IEEMA) from 20th to 26th October 2021. The exhibition covered display of indigenously developed technology, products and solutions. CPRI displayed its Credentials, Research, Testing facilities, Consultancy and Training activities. The stall was visited virtually by over 100 visitors from Industry, Research Organizations, Government Departments etc. Photograph of CPRI stall is placed below:

View of CPRI Stall

Painting Competition on Energy Conservation

- The State Level Painting Competition on Energy Conservation 2021 was conducted in the premises of Centre for Collaborative and Advanced Research (CCAR), CPRI, Bengaluru, on 8th December 2021. About 44 students from Group-A and 46 students from Group-B attended the Painting Competition from all over Karnataka State. The Awards Ceremony was held at SJ Auditorium, CPRI, Bengaluru where 13 winners (1st, 2nd, 3rd and 10 consolation prizes) each from Group-A & B, were awarded cash prizes and certificates.

Photo of Winners Group - A

Photo of Winners Group – B

The prize distribution function was presided by Shri. V. S. Nandakumar, Director General, CPRI. Smt. Siriyannavar Lalitha Chandrasekhar, Director of Public Instruction (Minority Education), Government of Karnataka was the Chief Guest and Dr. Thomas P, Additional Director, CPRI, Bengaluru graced the occasion and distributed the prizes to the winners. The Programme was co-ordinated by Dr. M G Anandakumar, Joint Director, CPRI, Bengaluru and State Nodal Officer-Karnataka. About 250 people including children, parents and invitees attended the programme. The Jury Members were felicitated during the function. The programme concluded with vote of thanks followed by National Anthem.

Section 6

Training Activities

TRAINING ACTIVITIES & PROGRAMMES

Webinars / Conferences / Workshops / Training Programmes Organised by CPRI during the year 2021-22

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.

Webinars/ Conferences/ Workshops /Training Programmes/Tutorials organized by CPRI during the year 2021-22:

Capacitors Division

1) On-site training program on “Diagnosis and Condition Monitoring of Generator Transformers-at site” at Idukki Power Station, M/s KSEB, Moolamattom, held on 17th November 2021.

2) On-site training program on “Condition Assesment of HV circuit breakers at site”, at Teesta Low Dam House (TLD-III), M/s NHPC India Ltd., Rambi, held on 17th February 2022.

Cables & Diagnostics Division

3) One day Webinar on **"**Electrical Insulation and Flame-Retardant Properties of Polymers**"**, at CPRI, Bengaluru, held through online/virtual mode, on 11th November 2021.

4) Five days Residential Exposure Training progrmme on **"**PVC/XLPE Insulated Power Cables as Per IS 694, IS 1554 & IS 7098**"** for the senior officers of M/s. Central Institute of Petrochemicals Engineering and Technology (CIPET) held at CPRI, Bengaluru, from 6th to 10th December 2021.

5) Two days **"**11th International Conference on Power Cables "CABLETECH 2022", held in virtual mode, on 10th & 11th February 2022.

Dielectric Materials Division

6) Training Programme on "Condition Monitoring of Transformer by oil analysis and safe handling of PCB contaminated oil in transformers", for the engineers of M/s. KPCL, (ED), Bangalore, held at CPRI, Bangalore, on 3rd August 2021.

7) Training Programme on "Testing of Lubricating Oil" for the Engineers of M/s. Druck Green Power Corporation Limited, Bhutan, held at CPRI, Bangalore, on 5th & 6th August 2021.

8) Training Programme on "Transformer oil analysis, DGA and Furan" for the engineers of M/s. Karnataka Power Transmission Corporation Ltd. (KPTCL), Bangalore, held at CPRI, Bangalore, on 29th & 30th September 2021.

Electrical Appliances Technology Division

9) One-day webinar on "Lithium ion Technology: overview" held for M/s. Luminous, on 27th September 2021.

10) One-day webinar on "Protection of Enclosures from Environmental Ingress and test procedures" held on 3rd March 2022.

Energy Efficiency & Renewable Energy Division

11) Training cum awareness program on "Energy Efficiency and Energy Audit of Hydro Power Plants" for M/s. NEEPCO Engineers, held at Mizoram, on 23rd September 2021.

12) Webinar on "Rotating Electrical Machine-Testing and Quality Assurance", held on 4th March 2022.

13) Training Program on “Building Energy Audit” conducted for M/s. SRLDC, POSOCO, Bengaluru, through virtual online platform -CISCO WebEx., on 30th March 2022.

14) Training program on “Energy Audit of Hydro Power Station” conducted at Kishanganga Power Station, NHPC, Bandipora, on 31st March 2022.

Earthquake Engineering &Vibration Research Centre

15) Online tutorial on “Vibration and Seismic Testing of Equipment” held on 1st December 2021.

High Voltage Division

16) Webinar on “Best Grounding Practices”, held on 9th December 2021.

High Power Laboratory

17) Webinar on “Arc Flash Testing and Evaluation of Power System Equipment and Evolving Perspectives in Standards”, held on 23rd March 2022.

18) Webinar on "Emerging Trends and Challenges in Transformer Technology", held on 24th March 2022.

Materials Technology Division

19) Workshop on “Coal Quality impact on Boiler Performance and Fly Ash utilization”**,** held at M/s. KPCL, RTPS, Raichur Thermal Power Station, Raichur, on 23rd October 2021.

20) Workshop on “Remaining Life Assessment of Turbine-Generator shafts of Hydro plants”, held at M/s. Bhakra -Nangal Left Bank Power House, on 8th December 2021.

21) Workshop on “Corrosion mapping of boiler water wall tubes”, held at M/s. Santhaldih Thermal Power Station, Santhaldih, on 20th January 2022.

Power Systems Division

22) One day online workshop on “Protection Audit” organized for the officers of M/s. SKTPS, Kota, held at CPRI, Bangalore, on 2nd April 2021.

23) Three days Training Programme on “System Studies” for M/s. SJVNL Engineers, as a part of consultancy project for Luhri Stage I, Stage II and Sunni Dam HEP”, held at CPRI, Bengaluru, from 25th to 27th August 2021.

24) One day Webinar on “Power Quality” for the Engineers of National Academy of Broadcasting and Multimedia of Prasar Bharti-Delhi, held at CPRI, Bengaluru, on 21st September 2021.

25) Two days Virtual Online training programme on “Cyber Security for Hydro Power Plants” for officers and Executives of M/s. NHPC, Faridabad, held at CPRI, Bangalore, on 16th & 17th December 2021.

26) Two days online Training Programme on “Cyber Security for Hydro Power Plants” for Officers and Executives of M/s. NHPC, Chandigarh, held at CPRI, Bengaluru, on 10th &11th February 2022.

27) Two days online Webinar on “Cyber Security for Hydro Power Station” for Officers and Executives of M/s. NHDC, Bhopal, held at CPRI, Bengaluru, on 17th & 18th February 2022.

28) One day online Training Programme on “Cyber Security for Digital Substation”, held at CPRI, Bangalore, on 4th March 2022.

29) One day onsite Training Programme on “Generating Stations Protection and Protection Audit Observations”, for generation circle engineers of M/s. BBMB, held at Nangal, on 15th March 2022.

30) One day onsite Training Programme on “Review of Substations Protection and Protection Audit Observations” for transmission circle engineers of M/s. BBMB, held at Chandigarh, on 16th March 2022.

31) Two days online Training Programme on “Cyber Security for Hydro Power Plants” for Officers and Executives of M/s. NHPC Ltd., Faridabad, held at CPRI, Bangalore, on 28th & 29th March 2022.

Regional Testing Laboratory, Noida

32) One day Training Program on “Testing requirements of Static and Smart Energy Meters”, at RTL-CPRI, Noida, on 29th March 2022.

RTL, Kolkata

33) Training/Awareness Program on “Condition Monitoring of Transformer by Oil Analysis and Safe Handling of PCB Contaminated Oil in Transformers”, held at WBSEDCL, EETI, Kolkata, on 16th March 2022.

Short Circuit Laboratory

34) Webinar on "Methodologies of Temperature Rise Tests on Low Voltage Switchgear and Controlgear Assemblies as per IEC 61439-1:2020", held on 26th October 2021.

35) Webinar on "Latest IEC 62271 Series of Standards: Considerations for Temperature Rise Test on High Voltage Switchgear and Control Gear Equipment", held on 4th March 2022.

36) Webinar on "Distribution Transformers Assessment Through Testing and Analysis", held on 21st March 2022.

Switchgear Testing & Development Station, Bhopal

37) Webinar on "Testing and Certification of Switchgear and Controlgears Equipment as per National/International Standards" held on 24th September 2021.

38) Webinar on "Transformer oil testing and maintenance of Power Transformer through dissolved gas analysis", held on 29th October 2021.

39) Webinar on "LV Switchgear & Controlgear Under Electrical Equipment (Quality Control) Order, 2020", held on 2nd December 2021.

40) National Webinar on "Smart Energy Metering: Testing, Standards and Communication Technologies", held on 20th January 2022.

41) Webinar on "Best Practices in Transformer Design, Testing and Diagnostic in respect of IS & IEC Standards", held on 21st January 2022.

42) Webinar on "Thermal Performance of HT & LT Electrical Equipment", held on 9th February 2022.

43) Webinar on "Ingress protection & IK performance of HT and LT Electrical Equipments", held on 3rd March 2022.

Training Division

44) A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata,, held at CPRI, Bengaluru, from 19th July to 7th August, 2021.

45) A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL), Kolkata, held at CPRI, Bengaluru, from 16th August to 4th September 2021.

46) A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata, held at CPRI, Bengaluru, from 22nd November to 11th December 2021.

47) A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata, held at CPRI, Bengaluru, from 20th December 2021 to 8th January 2022.

48) A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata, held at CPRI, Bengaluru, from 17th January to 5th February 2022.

49) A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata, held at CPRI, Bengaluru, from 21st February to 12th March 2022.

50) 5 Day Residential Training Programme for Engineers of M/s. NHPC Ltd., held at CPRI, Bengaluru, from 21st to 25th March 2022.

TRC, Koradi

51) Training Programme on “Non-Destructive and Destructive Testing of boiler components of Thermal Power Plant”, held at M/s. Khaperkheda Thermal Power Station, Khaperkheda, on 1st July 2021.

52) Training programme on “Remnant Life Assessment of Turbine”, held at GMR Warora Energy Limited, Warora, on 27th August 2021.

53) Training Program on “Visual Inspection of Structures for Condition Assessment”, held at NTPC, Kayamkulam, on 7th October 2021.

UHVRL, Hyderabad

54) Webinar on “Requirements and Calibration of HVAC Test Systems as per IEC 60060-1 and 2”, held online, on 10th December 2021.

55) Webinar on “Requirements and Calibration of Impulse Voltage Measuring Systems”, held online on 22nd December 2021.

56) National Conference on “High Voltage Engineering and Technology”- NCHVET 2022, held online on 25th February 2022.

57) Webinar on “Importance of transformer oil testing in preventive maintenance of transformers”, held at UHVRL, CPRI, Hyderabad, on 25th March 2022.

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 Projects

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.

RCE proposal for Time Extension & Revised Outlay:

- Extension of time duration initially upto March 2023 and revised outlay of Rs.979.00 Crore in respect of 12th Five Year Plan Capital Project titled "Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators and associated equipment" and "Establishment of New Test Facilities" was approved by Ministry of Power, New Delhi, vide Letter No.4/1/2020-T&R dated 14th January 2022.

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

Sl. No.	Title of the Proposal	Cost (in Crores)
I.	**"Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators and associated equipment" under XII Plan**	
(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
III.	**'Establishment of New Test Facilities' under XII Plan Proposals'**	
(i)	Establishment of 40 kA continuous current Temperature Rise test Facility at HPL, CPRI, Bengaluru	15.00
(ii)	Establishment of Total Test Facility for Transformers at CPRI Western Zone	187.73

3 YEAR ACTION PLAN PROPOSALS

"R&D Schemes of Ministry of Power 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).

New Project Proposal:

- DIB proposal for Augmentation of existing Test Facilities & Establishment of New Test Facilities at various centers of CPRI, was approved by Ministry of Power, New Delhi, with an outlay of Rs.213.40 Crore vide Letter No.5/1/2021-T&R dated 21st January 2022.

Sl No.	Project Component	CPRI Units at	Total Cost (in Rs. Cr)
1.	Test facilities for Smart Meters, RTUs, and IEDs including cyber security tests.	Bhopal, Hyderabad, Noida, Raipur, Nashik, Bangalore	76.40
2.	a) Test facilities for Routine tests, Impulse Test and Temperature Rise Test on Distribution Transformers	Hyderabad, Noida, Raipur	16.00
	b) Setting up of 10/350 micro second Impulse Current Test Facility	Bangalore	16.00
3.	Augmentation of Test Facilities Related to Instrument Transformers, Insulators and Power Transformers.	Hyderabad	65.00
4.	Modernization of Existing Synthetic test facility at High Power Laboratory, Bengaluru	Bangalore	40.00
		Total	**213.40**

Section 8

Administrative Matters

ADMINISTRATIVE MATTERS

Governance

The following distinguished persons have joined the Governing Council and the Society of CPRI as members in 2021-22:

1) Shri B K Arya, Chairperson, Central Electricity Authority has assumed charge as Vice-President
2) Shri Jithesh John, IES, Economic Adviser, Ministry of Power as Member
3) Shri A Balan, Member (Planning), Central Electricity Authority as Member
4) Shri Vipul Roy, President, IEEMA and MD, M/s. Elmex Controls Pvt. Ltd. as Member

The following distinguished persons joined the Standing Committee of CPRI as Members in 2021-22:

1) Shri Gautam Roy, Member (Power System), CEA as Member
2) Shri Jithesh John, IES, Economic Adviser, Ministry of Power as Member

During the course of the year, the 85th Standing Committee Meeting of CPRI was held through Virtual Mode on 31st December 2021 and 86th Meeting of CPRI Governing Council and 44th Annual General meeting of CPRI Society was held through Virtual Mode on 25th February 2022 to consider various issues pertaining to the Institute.

Important Events

- A team of experts from VTU, Belgaum conducted the Local Inquiry Committee (LIC) visit on 4th February 2022 through video conference mode in connection with continuation of VTU Research Centre at CPRI for Electrical, Mechanical and Civil Engineering branches for the academic year 2021-22.

- Dr. B.R. Ambedkar's 130th Birth Anniversary was celebrated at CPRI, Bengaluru, on 14th April 2021 by offering floral tributes to the Portrait of Dr. Baba Saheb Bhimrao Ambedkar.

- A meeting under the chairmanship of Secretary (Power) held through video conferencing to discuss draft concept note on "National Mission on use of biomass in thermal power plants" on 17th May 2021.

- A meeting was held under the chairmanship of Joint Secretary (Trans, IT&CS), Ministry of Power through video conferencing mode to discuss R&D in Cyber Security for power sector, on 13th July 2021.

- The Second Meeting of National Electricity Plan (NEP) Sub-Committee IV- on "Technological Advancement and Research & Development" was held through video conference mode, on 18th August 2021.

- A meeting was held between POWERGRID and CPRI through Video Conferencing mode to discuss regarding formulation of a collaborative research project for development of nanofluids as next-generation insulation for transformer applications leading to deployment of the nanofluid based transformer oils in the field, on 07th September 2021.

- The Second Meeting of the committee on National Electricity Plan (2022-27) was held through video-conferencing mode, on 21st January 2022.

Meeting of Technical Committees of Research

- Meeting of the Technical Committee on Thermal Research was held on 06th August 2021, 17th September 2021, 20th September 2021, 25th September 2021, 25th January 2022 & 03rd March 2022.

- Meeting of the Technical Committee on Hydro Research was held on 10th August 2021, 24th January 2022 & 04th March 2022.

- Meeting of the Technical Committee on Grid, Distribution and Energy Conservation Research was held on 12th August 2021, 13th August 2021, 13th December 2021, 23rd February 2022 & 24th February 2022.

- Meeting of the Technical Committee on Transmission Research was held on 14th August 2021, 24th August 2021, 16th February 2022 & 02nd March 2022.

- The 23rd meeting of the Standing Committee on Research & Development (SCRD) was organized under the Chairmanship of Chairperson, CEA, through video conferencing mode, on 28th September 2021.

- The 24th meeting of the Standing Committee on R&D (SCRD) was held under the Chairmanship of Chairperson-CEA, through video conferencing mode, on 21st December 2021 to deliberate upon and consider the R&D project proposals for approval. Two NPP projects and One IHRD project was approved during the meeting.

- The 25th Standing Committee on R&D (SCRD) meeting was organized through video conferencing mode for approval of projects, on 17th March 2022. The meeting was Chaired by Chairperson, CEA and attended by Members from CEA, POWERGRID, NTPC, NHPC, TANGEDCO, BHEL.

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 2021-22, on 26th July 2021.

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 reported cases of sexual harassment of women 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 was closed from April 2020 and reopened in December 2021.

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 of the Institute during the year.

International Women's Day was celebrated at CPRI, Bengaluru, on 8th March 2022. Smt. Sowmya V, IRS, Joint Commissioner of Income Tax was the Chief Guest of the function and delivered the speech on Women Empowerment. As part of the celebrations, women employees expressed their support for the IWD 2022 campaign theme: #Break the Bias. Some of the photographs of the function are given below:

Statement indicating total number of employees in the Institute and number of women in each category as on 31st March 2022

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	9	0	0.00
4	Joint Director	42	7	16.67
5	Chief Administrative Officer (SG)	1	-	-
6	Chief Accounts Officer (SG)	1	-	-
7	Scientists/Engg Officers	135	18	13.33
8	Scientists/Engg Assistants	25	1	4.00

9	Non-Tech Officers	9	4	44.44
10	Office Staff/Stenographer	80	28	35.00
11	Library staff	1	1	100.00
12	Technicians	66	-	-
13	Technical Attendant/Attendant	53	3	5.66
14	Drivers/Cook-cum-care taker	8	-	-
15	Multi-Tasking Staff	26	3	11.54
	Total	**457**	**65**	**14.22**

Staff Strength of the Institute as on 31st March 2022

Sl.No.	Posts	Number of employees
1	Director General	1
2	Director	0
3	Additional Director	9
4	Joint Director	42
5	Chief Administrative Officer (SG)	1
6	Chief Accounts Officer (SG)	1
7	Scientific/Engg. Category	160
8	Technicians	66
9	Administrative & Supporting Staff	124
10	Supporting Technical Staff	53
	Total	**457**

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 undertaken with IT usage and web enabled technologies like display of Status of booking of test dates is 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.

Vigilance Awareness Week 2021 was observed by the Institute from 26th October 2021 to 1st November 2021 with the theme "Independent India @ 75: Self Reliance with Integrity; *स्वतंत्रभारत* @ 75: *सत्यनिष्ठासेआत्मनिर्भरता*". The observance of the week commenced by administering the Integrity pledge to the employees of the Institute on 26th October 2021 at 11:00 A.M.

CPRI banners on "Vigilance Awareness Week" were displayed at prominent locations in Head Office, Bengaluru and the Units of CPRI.

Background of the theme of Vigilance Awareness week - 2021 was displayed on the web page of CPRI and hyperlink for Integrity Pledge was provided in CPRI website. Employees of CPRI took e-pledge using the hyperlink provided in the website. Pamphlets on "Vigilance Awareness Week - 2021" and Posters received from CVC were displayed on Notice Boards and also mailed to all the employees of the Institute. Essay Competition was organized by the Institute in Kendriya Vidyalaya, Hebbal, Bangalore, to create awareness among the students on the subject" Independent India @75: Self Reliance with Integrity; स्वतंत्रभारत @ 75: ईमानदारी सेआत्मनिर्भरता".

The Vigilance Awareness Week concluded by awarding first, second and third cash prizes for the winners in the essay competition among the school students of Kendriya Vidyalaya, Hebbal, Bangalore.

Vigilance Cases

Nil

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 bearers are Dr. P. Thomas, Additional Director as Appellate Authority, Mr. M. Janardhana, Joint Director as Central Public Information Officer and Mr. G. Kishore Kumar, Engineering Officer Gr. 4 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 number of applications received and replies sent to applicants during the year 2021-2022 i.e., from 01.04.2021 to 31.03.2022 is given below:

No. of Applications received	Total Directly received applications	Applications forwarded by MoP	Applications forwarded by others	Applications transferred to other departments	Applications Rejected under the various clauses of section-8 RTI
110	92	44	NIL	1	4

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 2021-22. Reservation registers and Roster registers were updated for the year 2021-22.

Representation of Scheduled Caste, Scheduled Tribe & OBC as on 31st March 2022:

Group	Total	SC	ST	OBC	Others
A	**165**	38	14	33	80
B	**145**	27	21	30	67
C	**121**	32	13	39	37
MTS	**26**	11	3	1	11
Total	**457**	**108**	**51**	**103**	**195**
Percentage	-	**23.63**	**11.16**	**22.54**	**42.67**

The Annual Inspection of Central Power Research Institute (CPRI) - Review and implementation of Reservation Policy of Govt. of India was carried out by Inspection team from Ministry of Power on 25th February 2022 and the Inspection Report has been received.

Representation of Physically Challenged Employees as on 31st March 2022				
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	9	-	-
4	Joint Director	42	-	-
5	Chief Administrative Officer (SG)	1	-	-
6	Chief Accounts Officer (SG)	1	-	-
7	Scientists/Engg Officers	135	5	3.70
8	Scientists/Engg Assistants	25	1	4.00
9	Non-Tech Officers	9	0	0.00
10	Office Staff/Stenographer	80	4	5.00
11	Library staff	1	-	-
12	Technicians	66	-	-
13	Technical Attendant/Attendant	53	4	7.55
14	Drivers/Cook-cum-care taker	8	-	-
15	Multi-Tasking Staff	26	-	-
		457	**14**	**3.06**

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 grievance 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 2021-22, CPRI has redressed several grievance petitions including 21 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, transfer, 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 31/03/2022	Yet to Assess	At our Office
DARPG	0	2	2	2	0	0	0
Local/Internet	0	7	7	7	0	0	0
Pension	0	0	0	0	0	0	0
PMO	0	12	12	12	0	0	0
Total	0	21	21	21	0	0	0

CPRI Library and Information Centre, Bengaluru

The 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 the 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.

The Library consists of Windows and Ubuntu Computer systems with an Internet connection. A 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 Infrastructure

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

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

Library Collection for 2021-22

Library and Information Centre has a collection of 68948 documents, which consists of books, journals, bound volumes, Indian & International standards, Reference Books, Thesis and Technical papers. This year total of 170 documents are added to the stock which includes IEC, ASTM, BSI, ISO standards and other publications. The total number of users holding Library Membership is 158 numbers.

During this year, the Library has subscribed to Nineteen Journals which include both Indian and International publications. Library also subscribed to newspapers in different languages (Hindi, English and Kannada). In addition to Journals, Library has taken annual subscriptions to CIGRE Collective Membership, IEEE Xplore Digital Library Enterprise Level 1 and the Bureau of Indian Standards complete set. This year Library has also taken the Grammarly Premium annual subscription for the users.

Section 9

Finance & Accounts

Section-9: Finance & Accounts

The Institute has done well in its financial performance during the year 2021-22 and earned revenue of Rs.131.39 Crores

Revenue earnings during the past five years

Year	Revenue (Amount in Crores)
2021-2022	131.39
2020-2021	126.91
2019-2020	160.08
2018-2019	204.50
2017-2018	191.05

During the year under report, as against the revenue realization of Rs. 13138.68 lakhs, the expenditure on non-plan activities stood at Rs.12702.60 lakhs resulting in a surplus of Rs.436.08 lakhs. For the 33rd year in succession, the Institute has not drawn any Non-Plan Grant-in-Aid from the Government of India.

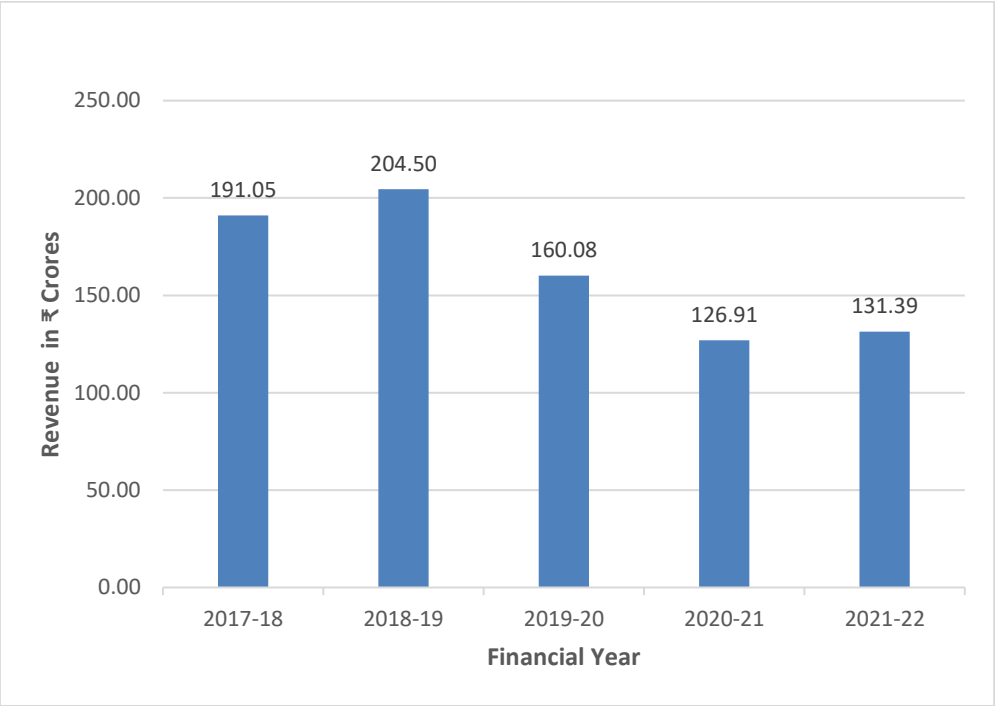
During the year, the expenditure under various heads has been as follows:

Non Plan Expenditure	Rs.12702.60 lakhs
Plan R & D Expenditure	Rs. 225.76 lakhs
Plan Capital Expenditure	Rs.2836.77 lakhs
RSoP Schemes	Rs.678.46 lakhs
NPP Schemes	Rs. 865.01 lakhs

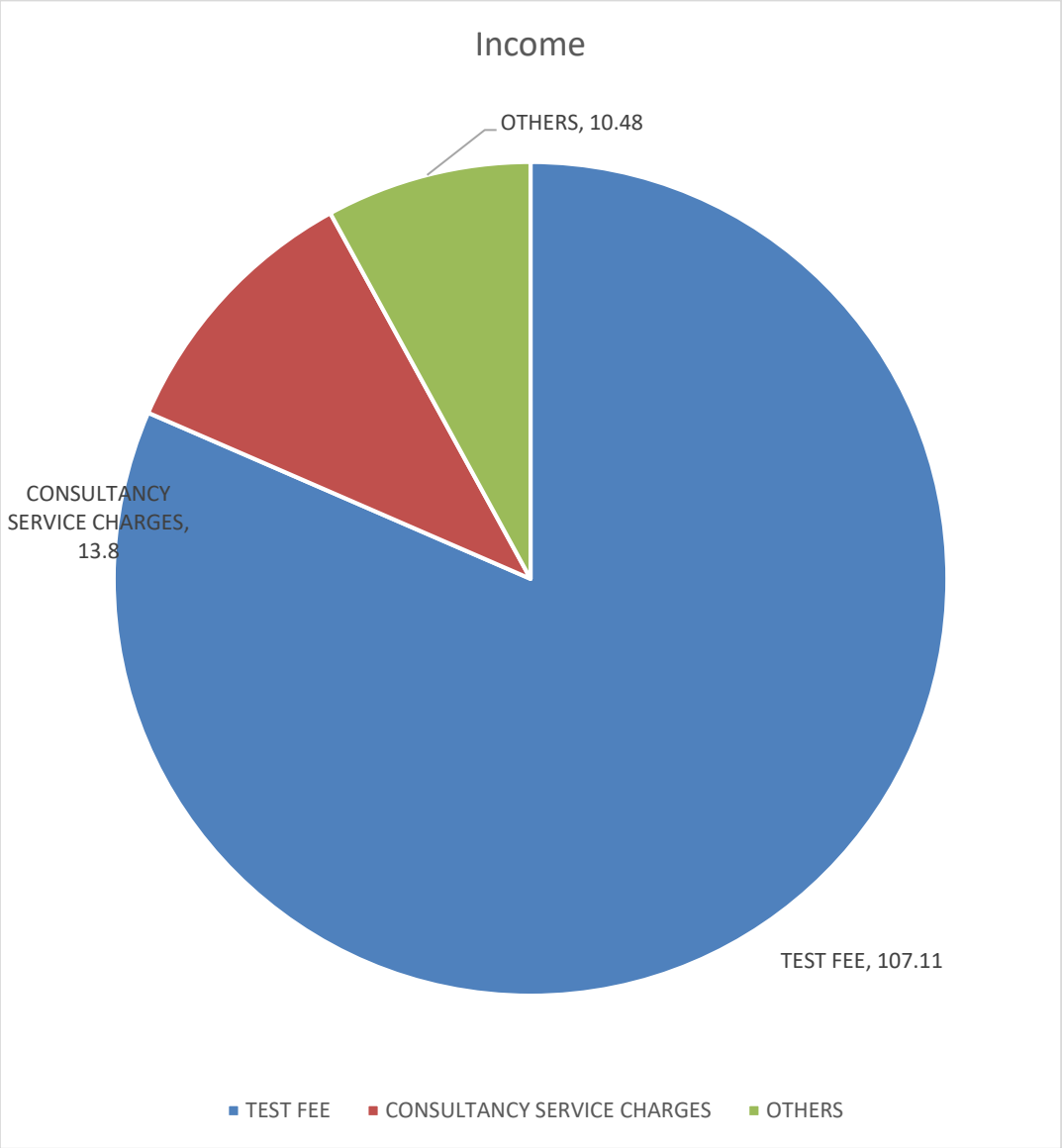
The Institute received grants-in-aid (Plan) of Rs.12000.00 lakhs from the Government of India during the year. The details along with Auditors Report are furnished in Appendix– 11.

As at the end of March 2022, the capital investment by the Government of India on the Institute has been Rs.115678.07 lakhs.

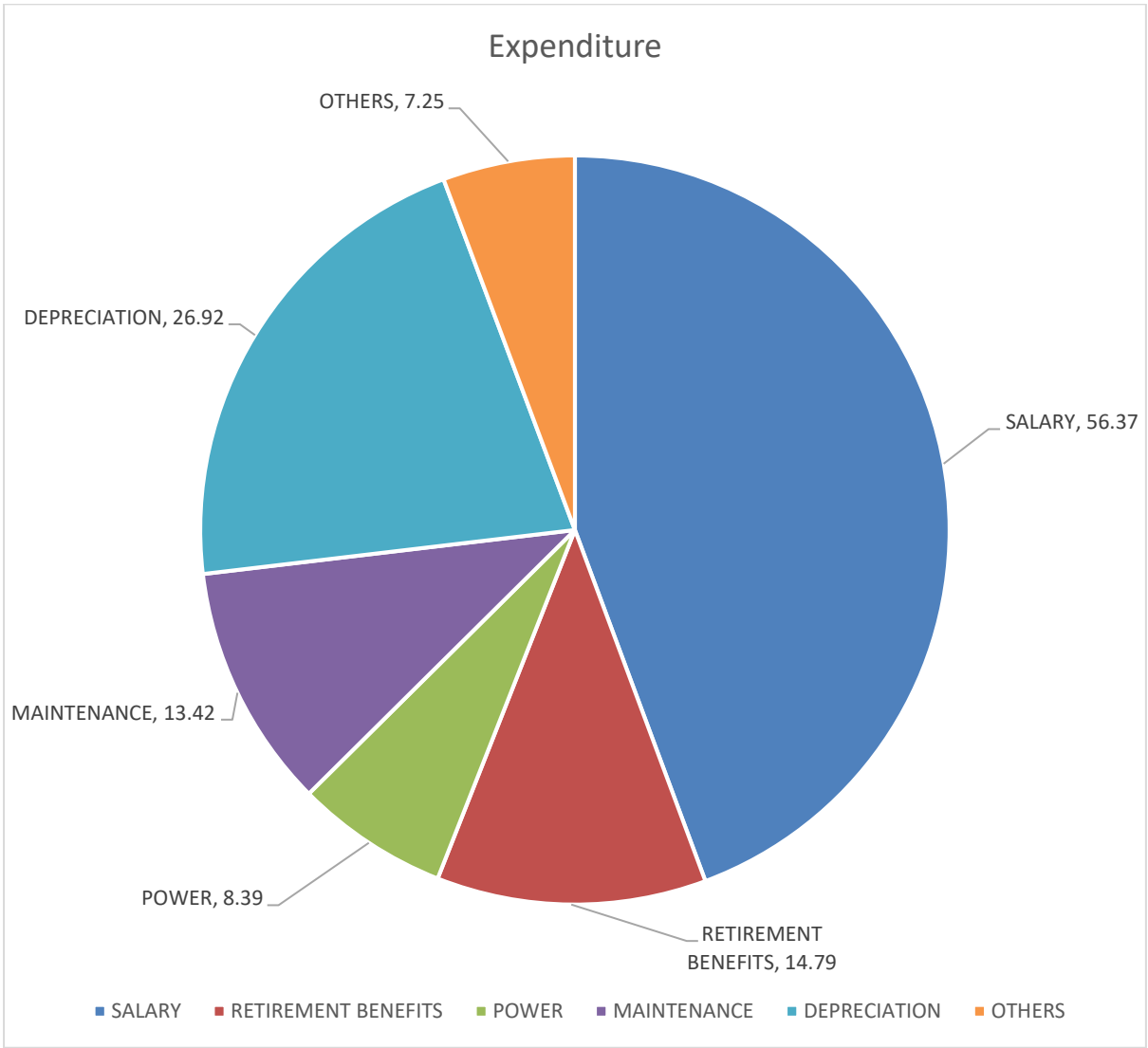
REVENUE EARNINGS DURING THE PAST FIVE YEARS (Rs.in Crores)



REVENUE DURING 2021-22 UNDER MAJOR HEADS (Rs. in Crores)



EXPENDITURE DURING 2021-22 UNDER MAJOR HEADS (Rs.in Crores)



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 2021 – 22 are listed below:

1. AWARD:

- **TOLIC Rajbhasha Shield (First)**

Central Power Research Institute (CPRI), Bangalore was once again awarded with TOLIC Rajbhasha Shield – First in Category 3 (more than 50 employees) for its excellent performance in Official Language Hindi during the year 2020-21, which was given by Chief Post Master General, Karnataka Circle and Chairperson, TOLIC (2), Smt. Sharada Sampath, during second meeting of TOLIC held online, on 22nd January 2022 at GPO, Bangalore. CPRI has received First Prize for its achievements during 2017 – 18, 2019 – 20 and 2020 – 21.

- **Regional Official Language Award**

Switchgear Testing and Development Station (STDS), Bhopal – a Unit of Central Power Research Institute received the Regional Official Language Award for its best performance in the implementation of Official Language Hindi during the year 2020-21. The award was presented during Joint Regional Official Language Conference organized at Madgaon, Goa and was jointly presented by Hon'ble Minister of State in Ministry of Home Affairs, Government of India Shri Ajay Kumar Mishra and Hon'ble Minister of State for Tourism, Government of India Shri Shripad Yesso Nayak to Shri M.K. Wadhwani, Additional Director & Unit Head, CPRI, STDS, Bhopal, on 22nd October 2021.

Shri. M.K. Wadhwani, Additional Director and Unit Head, STDS – CPRI, Bhopal receiving the award

2. All India Official Language Conference:

Shri Ramjit Singh, Additional Director, STDS, Bhopal participated in a two-day All India Official Language Conference organised by the Department of Official Language, Ministry of Home Affairs, New Delhi, at Deendayal Sankul, Trade Facilitation Center and Crafts Museum, Varanasi, under the Chairmanship of Shri Amit Shah, Hon'ble Minister of Home Affairs & Hon'ble Minister of Co-operation, Govt. of India, on 13th & 14th November 2021. In this conference, the contribution of Official Language Hindi in various fields and its challenges were discussed by many learned speakers. It was mentioned that we should recognize the special importance of Official Language Hindi and should feel proud in using it because it connects the people characteristically and culturally, at the National and International level.

3. Inspection:

a) Inspection of Central Power Research Centre, Bangalore by the Second Sub-Committee of Committee of Parliament on Official Language

The Second Sub-Committee of the Committee of Parliament on Official Language inspected CPRI, Bangalore, on 16th April 2021. The Committee reviewed the progress made by the Institute in the use of Hindi.

Officials of CPRI, Bangalore during inspection by the Second Sub-Committee of Committee of Parliament on Official Language in the presence of Senior Officers of Ministry of Power

b) Inspection of TRC, Nagpur by Second Sub-Committee of Committee of Parliament on Official Language

The Second Sub-Committee of the Committee of Parliament on Official Language had an inspection meeting with the Head of the Unit, Thermal Research Centre (TRC), Central Power Research Institute, Nagpur, on 28th December 2021.

The Committee reviewed the official language work being done in the Unit and gave suitable suggestions for improvement. Senior Officers from the Ministry of Power were also present during the occasion.

Officials of TRC, Nagpur during inspection by the Second Sub-Committee of Committee of Parliament on Official Language in the presence of Senior Officers of Ministry of Power

4. Hindi Workshop:

Expression Development Workshop

Expression Development Workshops were conducted on the following topics during March, June and September quarter to promote effective interaction with customers, to increase contact among the general public and to promote the use of official language.

1. Ozon ki kahaani -ojee ki jabaani – March 29, 2021
2. Jalvaayu Parivartan :Prabhaav - 26 June 2021
3. jaiv Proudyogiki: vardaan athava abhishaap- 24 September 2021

In these sessions, Expression Development Workshop was conducted in Hindi through interactive discussion by showing DVDs received from Center for Science and Environment, New Delhi to the officers/employees so that Hindi could be brought closer to the general public. In these sessions, all the participants interacted enthusiastically and made the program successful.

All the officers/employees expressed their views on the above topics and in this way exchange of views in Hindi helped in removing their hesitation to communicate in Hindi.

There was open invitation to all in this session and scientific/technical officers were also motivated to write technical articles during this session.

5. Training:

Two Engineering Assistants have been nominated for the online classes of Prabodh conducted by the Hindi Teaching Scheme.

6. Publications:

a. Annual Report

The Annual Report of the institute for the year 2020-21 has been published in bilingual.

7. Hindi Month & Hindi Divas:

Hindi Month was celebrated from 6th to 28th September 2021. Crossword Puzzle, Quiz, Translation (Hindi - English - Hindi) were conducted. Quiz and translation competitions were conducted online. Many officers and employees of the Institute participated in these competitions with great enthusiasm. Under the incentive scheme, original noting and drafting competition was organized in which one first prize, three second prizes and three third prizes were awarded.

Hindi Divas Celebration

Hindi Divas was celebrated on 28th September 2021 at CPRI, Bangalore. The Institute has always given utmost importance to the implementation of Official Language and all precautions are being taken to achieve the specified goals. A Report on the implementation of Official Language Policy during the year 2020-21 was presented during the function. Prizes were distributed to the winners of various competitions.

Hindi Divas celebration at CPRI, Bengaluru

8. Facility of Hindi in all computers:

Unicode has been activated in all computers and training has been given to everyone to work in it. Training on VOICE TYPING has also been provided to the clerical staff of the institute. Unicode being highly friendly and with the help of google translation and VOICE TYPING, employees / officers are trying to do majority of their work in Hindi.

9. Activities of Town Official Language Implementation Committee:

a. The second meeting of TOLIC-II was conducted on 17th March 2021. The Chief Administrative Officer and Senior Hindi Translator attended the meeting.

b. The first meeting of TOLIC-II was Organized Online mode on 7th October 2021. Director General, Chief Administrative Officer, Senior Hindi Translator and Junior Hindi Translator attended the meeting.

c. Under the aegis of TOLIC-II, Bangalore, CPRI Organized Cross Word Puzzle competition in Hindi for all Central Government employees under Inter Organisational competitions, on 23rd November 2021.

d. The officers of the Institute also participated in the competitions organized by other organizations under TOLIC-II, Bangalore.

e. TOLIC Rajbhasha meeting for the year 2021-22 was conducted at CPRI, Bhopal on 29th July 2021. More than 50 participants from various Central Government Offices in Bhopal took part in meeting.

f. TOLIC Rajbhasha meeting for the year 2021-22 was conducted in CPRI, Bhopal, on 15th December 2021. More than 40 participants from various Central Government Offices in Bhopal took part in the meeting.

10. Other Activities:

a. Learn “a word - a day” Scheme

Boards are installed at the Main Gate of the Institute and at the entrance of the Head Office. Two staff members of the Institute have been provided with the administrative terminology sent by the Commission for Scientific and Technical Terminology, with the help of which a Hindi word with its English meaning is being written on these boards every day by the employees specified for this work.

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 the employees are requested to use these words in their day-to-day official work during that month.

c. All Invitation Cards in Bilingual

All the invitation cards related to the programs of the Institute like Institute Day, Annual Customer Meet etc. are prepared in bilingual.

d. Tenders in Bilingual

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

e. Advertisements in Bilingual

All the Advertisements relating to Posts are being issued in bilingual and also published in Newspapers in bilingual. They are also uploaded on the CPRI website simultaneously.

11. Website:

The website of the Institute www.cpri.res.in is available in Bilingual and is being updated from time to time.

12. 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.

13. English-Hindi Phrases and Notings printed on folders:

The file folders used in the Institute contain 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.

Section 11

Appendices - 1 to 10

Appendix-1

THE MEMBERS OF STANDING COMMITTEE AS ON 31ST MARCH 2022

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 Gautam Roy** Member (Power System) Central Electricity Authority Sewa Bhawan R.K.Puram New Delhi – 110 066	Member
4	**Shri Jithesh John, I E S** Economic 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

Shri. Goutam Roy

CHAIRPERSON

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

MEMBERS

Executive Director Southern Region Transmission System – II, Power Grid Corporation of India, Sahakara Bhavana, 32, Race Course Road, Bengaluru 560001	**Sri. Amit Roy** **Scientist F and Head** Bureau of Indian Standards Peenya Industrial Area, 1st Stage Tumkur Road, Bengaluru-560058
Sri. M. K. Srivastava **Executive Director (Engineering)** NTPC Ltd., Engineering Office Complex Sector-24, Noida-201301 (UP)	**Sri. Harshavardhan Kulkarni** **Head (Product Development)** Siemens Ltd., M.V.Switchgear & Switch Boards P.B. No. 85, Thane Belapur Road Thane 400601
Ms. S. N. Bhagyashree **General Manager** Solar Business Division, Bharat Heavy Electricals Ltd., Prof. C.N.R Rao Circle opp IISC, Malleshwaram Bengaluru-560012	**Sri. P P Mukherjee** **ED Commercial** West Bengal State Electricity Distribution Company Ltd., Vidyut Bhavan, Block – DJ Sector – II Bidhannagar, Kolkata 700091
Sri. Narendra Kumar **Technical Director** Karnataka Power Corporation Ltd. 82, Shakthi Bhavan, R.C.Road, Bengaluru 560001.	**Ms. Charu Mathur** **Director General** Indian Electrical & Electronics Manufacturers Association 501, Kakad Chambers 132, Dr. A. Besant Road Mumbai-400018
Shri V. S. Nandakumar **Member - Convener** Director General Central Power Research Institute Prof. C.V.Raman Road, P.B. No. 8066, Sadashivanagar P.O., Bengaluru 560080.	

Appendix-3

THE MEMBERS OF STANDING COMMITTEE ON RESEARCH & DEVELOPMENT (SCRD) AS ON 31ST MARCH 2022

Sl No	SCRD - Main Committee	Name & Address	Position
1	Chairperson-In charge	Shri B. K. Arya Central Electricity Authority New Delhi	**Chairman**
2	Addl. Secretary & FA, 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 Jithesh John, I E S Ministry of Power Govt. of India Shram Shakti Bhawan New Delhi – 110 001	Member
4	Member Planning (R&D)	Shri A. Balan Office of Member Planning Central Electricity Authority 3rd Floor, Sewa Bhavan R K Puram, Sector -1, New Delhi – 110 066	Member

Sl No	SCRD - Main Committee	Name & Address	Position
5	Chairman of Technical Committee for Thermal research	Prof. Gautam Biswas Professor Department of Mechanical Engineering Indian Institute of Technology Kanpur, Kalyanpur Kanpur-208 016	Member
6	Chairman of Technical Committee for Hydro Research	Prof. R P Saini Professor Department of Hydro and Renewable Energy Indian Institute of Technology - Roorkee Roorkee – 247 667	Member
7	Chairman of Technical Committee for Transmission Research	Prof. K Shanti Swarup Professor Department of Electrical Engineering Indian Institute of Technology – Madras Chennai – 600 036	Member
8	Chairman of Technical Committee for Grid, Distribution & Energy Conservation	Prof. Sukumar Mishra Professor Department of Electrical Engineering Indian Institute of Technology – Delhi	Member

Sl No	SCRD - Main Committee	Name & Address	Position
		New Delhi-110 016	
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 – 110 011	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. Sir C V Raman Road Sadashivanagar P.B. No.8066 Bangalore – 560 080	**Convener**

Sl No	SCRD - Main Committee	Name & Address	Position
	Special Invitees		
13	BHEL	Shri S B Naithani Executive Director (CDT & CTM) Bharat Heavy Electricals Limited, BHEL House, Siri Fort, New Delhi – 110 049	Member
14	POWERGRID	Executive Director (Incharge of R&D) Power Grid Corporation of India Ltd. 'Saudamini', Plot No. 2, Sector 29 Gurgaon – 122 001	Member
15	NTPC (NETRA)	Shri Shaswattam Chief General Manager (NETRA) NTPC-NETRA E3 Ecotech-II, Udhyog Vihar Gautam Budh Nagar – 201 306	Member
16	NHPC	Shri Rajesh Sharma Executive Director, O&M Section,	Member

Sl No	SCRD - Main Committee	Name & Address	Position
		NHPC Limited NHPC Office Complex Sector-33 Faridabad – 121 003	
17	MNRE	Scientist -G Ministry of New and Renewable Energy Block 14, CGO Complex Lodhi Road New Delhi – 110 003	Member
18	DST	Dr. JBV Reddy Scientist -E 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 2022

Sl. No.	Affiliation	Position	Name & Address
1	Professor from IIT-B, Mumbai.	Chairman	Prof. Gautam Biswas Professor Department of Mechanical Engineering Indian Institute of Technology-Kanpur, Kalyanpur, Kanpur-208 016
2	ED, NETRA, NTPC	Member	Shri. S Sarkar General Manager (NETRA), NTPC Ltd. E3-Ecotech-II, Udhyog Vihar Gautam Budh Nagar – 201 306
3	ED- BHEL (Thermal)	Member	Shri Dipesh Palit GM (PEM) Bharat Heavy Electricals Limited, BHEL House, Siri Fort New Delhi – 110 049
4	Chief Engineer, (TETD),CEA	Member	Shri D K Srivastava 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, MTD, CPRI, Bengaluru
			Dr. S K Nath, Joint Director, TRC, CPRI, Nagpur
7	Chief Engineer-R&D / Director-R&D, CEA	Permanent invitee	Shri A K Rajput Chief Engineer (R&D) Central Electricity Authority, 3rd Floor, Sewa Bhavan R K Puram, Sector -1, New Delhi – 110 066
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 2022

Sl. No.	Affiliation	Position	Name & Address
1	Professor from IIT - Roorkee	Chairman	Prof. R P Saini Professor Department of Hydro and Renewable Energy Indian Institute of Technology-Roorkee Roorkee- 247 667
2	ED- BHEL (Hydro Expert)	Member	Shri S M Ramanathan G M (Hydro) Bharat Heavy Electricals Limited, BHEL House, Siri Fort New Delhi – 110 049
3	ED - NHPC (Hydro Expert)	Member	Shri Rajesh Sharma Executive Director, O&M Section NHPC Ltd. NHPC Office Complex Sector-33, Faridabad – 121 003

4	ED – SJVNL (Hydro Expert)	Member	Er Harish Kumar Sharma Chief General Manager HoD, Electrical Design Department SJVNL Shakthi Sadan, Shanan Shimla – 171 006
5	Chief Engineer, CWC, New Delhi	Member	Shri S K Sibal Chief Engineer, Design (N&W) Central Water Commission 4th Floor (South), 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
			Dr. R K Kumar Joint Director, MTD, CPRI, Bengaluru

8	Chief Engineer-R&D / Director-R&D, CEA	Permanent invitees	Shri A K Rajput Chief Engineer (R&D) Central Electricity Authority 3rd Floor, Sewa Bhavan, R K Puram, Sector -1, New Delhi – 110 066
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 2022

Sl.No	Affiliation	Position	Name & Address
1	Professor from IIT-Kanpur	Chairman	Prof. K Shanti Swarup Professor Department of Electrical Engineering Indian Institute of Technology-Madras Chennai – 600 036
2	ED-BHEL (Transmission)	Member	Smt. Aruna Gulati AGM (TBG) Bharat Heavy Electricals Limited BHEL House, Siri Fort New Delhi – 110 049
3	ED-POWERGRID	Member	Executive Director (Technology Development) Power Grid Corporation of India Limited “Saudamini”, Plot No. 2, Sector-29, Gurgaon – 122 001
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	Member	Director (Transmission) Karnataka Power Transmission Corpn. Ltd.

	(KPTCL)		Kaveri Bhavan, K.G. Road Bangalore – 560 009
6	Representative of IEEMA	Member	Shri Mustafa Wajid Managing Director M/s. MHM Holdings Private Limited #52/1, Basappa Road Shanthinagar Bangalore – 560 027
		Member	Ms. Aaryaa Satyanarayana Director M/s. Venson Electric Private Limited #331, 9th Cross, 4th Phase, Peenya Industrial Area Bangalore -560 058
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	Shri A K Rajput Chief Engineer (R&D) Central Electricity Authority 3rd Floor, Sewa Bhavan, R K Puram, Sector -1, New Delhi – 110 066
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 2022

Sl. No.	Affiliation	Position	Name & Address
1	Prof. S.V. Kulkarni, Professor IIT - Mumbai	Chairman	Prof. Sukumar Mishra Professor Department of Electrical Engineering Indian Institute of Technology-Delhi New Delhi-110 016
2	Representative from BEE	Member	Shri Sameer Pandita 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	Scientist -G Ministry of New and Renewable Energy Block 14, CGO Complex, Lodhi Road New Delhi – 110 003
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 M/s. MHM Holdings Private Limited #52/1, Basappa Road, Shanthinagar Bangalore – 560 027
		Member	Ms. Aaryaa Satyanarayana Director M/s. Venson Electric Private Limited #331, 9th Cross, 4th Phase, Peenya Industrial Area, Bangalore -560 058
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	Shri A K Rajput Chief Engineer (R&D) Central Electricity Authority, 3rd Floor, Sewa Bhavan, R K Puram, Sector -1, New Delhi – 110 066
9	CPRI	Member Convener	Head, R&D Management Division CPRI, Bengaluru

Appendix – 8

Membership of CPRI Officers in International / National Committees

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
1.	V. S. Nandakumar Director General, CPRI	Chairman	Electro Technical Division (ETD) of BIS
2.	M.K. Wadhwani Additional Director STDS-CPRI, Bhopal	Chairman	High Voltage Switchgear & Control Gear Sectional Committee ETD-08 of BIS
			Fuses Sectional Committee ETD - 39
		Member	BIS Power Transformers Sectional Committee ETD-16
3.	B.A. Sawale Additional Director STDS-CPRI, Bhopal	Chairman	BIS ETD-13- Equipment for Electrical Equipment for Electrical Energy Measurement and Load Control
		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 - Instrument Transformers & ETD – 07 – Low Voltage Switchgear & Controlgear
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	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	BIS ETD-16 - Transformers
		Member	BIS ETD-08 - High Voltage Switchgear and Controlgear
			BIS ETD-47 – Railway Electric Traction Equipment
			TC-STL
			NEP-2022-27
			Advisory Board of National Power Training Institute, HLTC, Bengaluru
7.	Dr. P Thomas Additional Director CPRI, Bengaluru	Chairman	BIS Sectional Committee ETD-03 – Fluids for Electrotechnical Applications
		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 13/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 57/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
		Member Secretary	BIS LITD-10, Joint Working Group, 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 "Lamps and related Equipment"
			BIS-Sectional Committee ETD-28 "Solar Photovoltaic Energy Systems"
			BIS Energy Storage Committee, ETD-52
		Certified "Energy Auditor and Energy Manager"	Bureau of Energy Efficiency, Ministry of Power, Govt. of India
		Member	BIS Illumination Engineering and Luminaires Sectional Committee, ETD-49
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
12.	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
		Individual Member	SCB2 Overhead Lines, CIGRE, Paris
13.	Dr. V. Saravanan Joint Director CPRI, Bengaluru	Alternate Member	Clay and Stabilized soil products for construction, CED -30
		Member	Sub Group-4 (National Mission on the Utilization of Biomass in Thermal Power Plants, Ministry of Power)
			Biomass utilization relaxation Committee (CEA, Ministry of Power)
14.	Dr. Amit Jain Joint Director CPRI, Bengaluru	Principal Member	BIS-LITD 10 (Power System Control and Associated Communications Sectional Committee)
		Member	Task Force to develop the framework for promotion of application of artificial intelligence and machine learning, big data, block chain technology, etc. in Power Sector, constituted by the Ministry of Power
15.	T. Bhavani Shanker Joint Director CPRI, Bengaluru	Chairman	Sectional Committee on Power Capacitors ETD-29 of BIS, New Delhi
		Member	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 Self healing 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
			WG-15 -“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.
16.	S Shyam Sundar Joint Director CPRI, Bengaluru	Member	Sectional Committee of BIS, ETD 50 - LVDC Power Distribution Systems
17.	Dr. J. Sreedevi Joint Director CPRI, Bengaluru	Principal Member	BIS - Wind Turbines Sectional Committee ETD - 42
		Alternate Member	HVDC Power Systems Sectional Committee, ETD-40
18.	G Pandian Joint Director CPRI, Bengaluru	Alternate Member	BIS Sectional Committee, ETD-36 – Tools & Equipment for Live Working
19.	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

20.	G.R. Viswanath Joint Director CPRI, Bengaluru	Principal Member	ETD-03 – Fluids for Electrotechnical applications - BIS Sectional Committee
21.	Manohar Singh Takkher Joint Director STDS-CPRI, Bhopal	Member	High Voltage Switchgear & Control Gear Sectional Committee ETD-08
22.	Sumbul Munshi Joint Director STDS-CPRI, Bhopal	Member	BIS Committee on Low Voltage Switchgear & Control gear ETD - 07
23.	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
		Accredited "Energy Auditor and Energy Manager"	Bureau of Energy Efficiency, Ministry of Power, Govt. of India
24.	Yugal Agrawal, Joint Director STDS-CPRI, Bhopal	Member	BIS Sectional Committee ETD-47, Electrical Traction Equipments
25.	G. Girija Joint Director CPRI, Bengaluru	Member	BIS Sectional Committee for Environmental Testing Procedures – LITD- 01
26.	Dr. P. Chandrasekhar Joint Director CPRI, Bengaluru	Member	Bureau of Energy Efficiency (BEE), S&L Program of Refrigerator & AC
			BIS Sectional Committee – MED-03 – Refrigeration and Air Conditioning
27.	K. Devender Rao Joint Director UHVRL - Hyderabad	Member	CIGRE, India

28.	K.A. Aravind Joint Director UHVRL - Hyderabad	Alternate Member	Bureau of Indian Standards (BIS), ETD-19 - High Voltage Engineering
29.	G. Kishore Kumar Engg. Officer Gr.4 CPRI, Bengaluru	Member	Clay and Stabilized soil products for construction, CED -30 of BIS
			MTD-4, BIS - Flat Steel Products Subcommittee, MTD 4.3
30.	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 Power System Control and Associated Communications-Panel-2 Security
			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
31.	Thirumurthy Engg. Officer Gr.4 CPRI, Bengaluru	Alternate Member	BIS ETD - 09 Power Cables Committee
32.	Viji Bharathi 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
33.	Dr. Kuldeep Singh Rana Scientific Officer Gr.3 CPRI, Bengaluru	Principal Member	BIS ETD- 10 – Primary Cells and Batteries & ETD-11 – Secondary Cells and Batteries
		Member	ETD-51 – Electro technology in Mobility
			S&L program for Advanced Chemistry Cell (ACC) & Batteries for electric vehicle, BEE
			Quality Council of India, Steering Committee drone certification (Battery)
			Sub-Group-3-Technology Group on Storage Technologies of Policy Frame work to promote Energy Storage in Power Sector, MoP/CEA
34.	Dharmesh Yelamanchi Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	BIS Sectional Committee, ETD-06 – Electrical Insulators and Accessories
			BIS Sectional Committee, ETD-19 – High Voltage Engineering
35.	Dr. Manohar Singh, Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	ETD -35 Power Systems relaying Committee
			ETD -42 Wind Turbines Sectional Committee
36.	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
37.	Shaileshwari M U Engg. Officer Gr.3 CPRI, Bengaluru	Member	BIS LITD-10, Panel - 2 on Security

38.	D. Venkatesh Engg. Officer Gr.3 CPRI, Bengaluru	Principal Member	ETD-32 – Electrical Appliances, BIS
39.	Rajaram Mohanrao Chennu Engg. Officer Gr.3 CPRI, Bengaluru	Member	ETD-16 – Transformers, BIS
40.	Dilip Kumar Puhan Engg. Officer Gr.3 CPRI, Bengaluru	Member	Standardization of the Management of Assets in Power Network Sectional Committee, ETD-53, BIS
41.	Dr. Moumita Naskar Scientific Officer Gr.3 CPRI, Bengaluru	Member	Winding wires Sectional Committee, ETD- 33
42.	Ramesh Patil Engg. Officer Gr.3 CPRI, Bengaluru	Member	Bureau of Indian Standards (BIS) Under LITD -10 Group Adoption CIM for Indian Utility
43.	K. Vijaya Kumar Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	Standing Committee of experts to Investigate Cause of failure of Towers, Central Electricity Authority (CEA), New Delhi
			Use of Structural Steel in Overhead Transmission Line Tower and switch yard Structures, BIS Committee CED-7
			Committee for Audit of Transmission line tower with respect to design & life of Towers, Central Electricity Authority CEA/CEID, New Delhi.
44.	Dr. P. Raja Mani Engg. Officer Gr.3 UHVRL-CPRI, Hyderabad	Alternate Member	ETD 40 HVDC Power Systems, BIS
45.	Jithin Pauly P Engg. Officer Gr.2 CPRI, Bengaluru	Member	IEC TC 37 MT4
			IEC TC 37 PT 60099-11
		Alternate Member	Sectional Committee ETD-30 – Surge Arresters, BIS

			Sectional Committee, ETD-48 – Standardization in the Field of UHV AC Transmission System, BIS
46.	Sreeram V Engg. Officer Gr.2 CPRI, Bengaluru	Member	ETD-53 - Standardization of the Management of Assets in Power Network Sectional Committee, BIS
			CIGRE NSC A3
47.	Ashitha P N Engg. Officer Gr. 1 CPRI, Bengaluru	Principal Member	Solid Electrical Insulating Materials and Insulation Systems Sectional Committee, ETD-02
48.	K Jeykishan Kumar Engg. Officer Gr.1 CPRI, Bengaluru	BIS Young Professional (Alternate Member)	BIS Sectional Committee on Electrotechnology in Mobility (ETD-51)

Appendix – 9

Papers presented / published indicating Event / Venue / Journal for 2021-22

Capacitors Division

1. T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam & A. Sheik Mohamed, titled "Performance analysis of Hybrid Ultra Capacitor (HUC) based Solar Microgrid for household applications", at "International Virtual Conference on Electrical Control and Instrumentation Engineering (IEEE-ICECIE 2021), organized by IEEE-Malaysia, on 27th November 2021.

2. T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam & A. Sheik Mohamed, titled "Evaluating the Performance of Hybrid Ultra Capacitor (HUC) based Hybrid Energy Storage System (HESS) for Electrical Forklift application", Journal of CPRI, Jan-June 2021.

3. V. Vaidhyanathan, T. Bhavani Shanker & A. Sheik Mohamed, titled "Temperature co-efficients of mixed dielectric capacitors used in HVAC systems", in National Conference on "High Voltage Engineering and Technology" (NCHVET-2022), organized by UHVRL, CPRI, Hyderabad, on 25th February 2022.

4. T. Bhavani Shanker, V. Vaidhyanathan & A. Sheik Mohamed, titled "Off-line and On-line diagnostic tests for condition assessment – Case studies of Generator-Transformers working for more than 30 years in a Hydro Power Station", at National Conference on "High Voltage Engineering and Technology" (NCHVET-2022), organized by UHVRL, CPRI, Hyderabad, on 25th February 2022.

Cables & Diagnostics Division

5. Arunjothi R, Satheesh Kumar P.V, Thirumurthy, Raja G.K, Meena K.P, titled "Characteristics of Power Cable Sheathing Materials with Thermal ageing", at 13th International Conference on the Properties and Applications of Dielectric Materials 2021 (ICPADM 2021), held at Johor Bahru, Malaysia, from 12th to 14th July 2021.

6. Moumita Naskar, Dharmendra H.M, Meena K.P, titled **"**Effect of UV Ageing on Thermo-Mechanical Properties of Ethylene-Vinyl Acetate Nanocomposite Encapsulant", at 13th International Conference on the Properties and Applications of Dielectric Materials 2021 (ICPADM 2021), held at Johor Bahru, Malaysia, from 12th to 14th July 2021.

7. Arunjothi R, Thirumurthy, Meena K P, titled **"**Sheath overvoltage on 220 kV XLPE cable under fault conditions**",** at 22nd International Symposium on High Voltage Engineering (ISH-2021) held at China, from 21st to 25th November 2021.

8. Arunjothi R, Dillip Kumar Puhan, Rajat Sharma, Meena K P, titled “Analysis of Partial Discharges of Power Cables with 50 Hz and VLF” at 22nd International Symposium on High Voltage Engineering (ISH-2021) held at China, from 21st to 25th November 2021.

9. Thirumurthy K, Satheesh Kumar P V, Meena K P, Raja G K , Arunjothi R, titled **“**Failure Analysis of Medium Voltage Single Bonded Cable System**”** at IEEE 5th International Conference on Condition Assessment Techniques in Electrical Systems (CATCON- 2021), held at NIT, Calicut, from 3rd to 5th December 2021.

10. Dillip Kumar Puhan, Thirumurthy, Rajat Sharma, K P Meena, titled “Analysis of Root Cause of Failure of a Turbo Generator Stator Winding”, at IEEE 5th International Conference on Condition Assessment Techniques in Electrical Systems (CATCON -2021), held at NIT, Calicut, on 3rd to 5th December 2021.

11. Moumita Naskar, Dharmendra H M, Meena K P, titled “Influence of Nano Zinc Oxide on EVA Encapsulant Material for Photovoltaic Applications**”,** at IEEE 5th International Conference on Condition Assessment Techniques in Electrical Systems (CATCON- 2021), held at NIT, Calicut, from 3rd to 5th December 2021.

12. Ashitha PN, S Akhil, titled **“**Development of Nano Alumina/Micro ATH Filled Silicone Elastomers for High Voltage Insulation Applications**”,** at 98th IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP), held from 12th to 15th December, 2021.

13. Dillip Kumar Puhan, Rajat Sharma, Meena K P, titled **“**An Approach to determine Health Index of Power Cable System” at 11th International Conference on Power Cables “CABLETECH 2022”, held on 10th &11th February 2022.

14. Moumita Naskar, Meena K P, titled **“**Tracking, erosion and morphological study of heat shrink anti tracking tubes**”,** at 11th International Conference on Power Cables, “CABLETECH 2022” on 10th &11th February 2022

15. Arunjothi R, Thirumurthy, Meena K P, titled **“**Fire Resistant Cables – Heat Release Measurements**”,** at 11th International Conference on Power Cables “CABLETECH 2022”, held on 10th &11th February 2022.

16. Meena K P, Thirumurthy, Raja G.K, Arunjothi. R, Satheesh Kumar P.V, titled **“**Pre-Qualification Test on 220 kV Cable System - CPRI’s Experience” at 11th International Conference on Power Cables “CABLETECH 2022” held on 10th &11th February 2022.

17. Ashitha PN, S Akhil, K.T Varughese, titled**,** “Influence of dispersing aids on nano alumina/micro aluminum tri hydrate filled silicone rubber composites for outdoor high voltage insulators**”,** in Journal of Applied Polymer Science, Wiley Publications, Vol.No.139, Issue No.17, December 2021.

Dielectric Materials Division

18. D. Gnanasekaran, A. Chavan & P. Thomas, titled "Insulating Properties of Eco-friendly Natural Esters Derived from Non-edible Vegetable Oil," 2021 IEEE International Conference on the Properties and Applications of Dielectric Materials (ICPADM), 2021, pp. 41-44, doi: 10.1109/ICPADM49635.2021.9493935. (Published on July 2021)

19. Ajith Kumar, V. Ravibabu, A. Ashokbabu and P. Thomas titled "Effect of Graphene Nanoplatelets (GNP) on the Dielectric and Thermal properties of Polystyrene(PS)/ Polyvinylidenedifluoride (PVDF) blends", at ICPADM 2021, Johor Bahru, Malaysia, held from 12th to 14th July 2021 , Pg-354-357

Electrical Appliances Technology Division

20. Kuldeep Rana et al. titled "Analysis of Electrochemical performance of Reduced graphene oxide based symmetric supercapacitor with different aqueous electrolyte", in online Vol. 25, No. 1, 2022, 22-31, https://doi.org/ 10.5229/ JKES. 2022.25.1.22

21. Dr.P.Chandra Sekhar, titled "Energy Efficiency Analysis of Inverter-based Home Appliances", at 7th National Conference and 1st International Conference on Refrigeration and Air Conditioning (NCRAC 2022), organized by IIT, Guhawathi and IIT, Tirupathi, held from 24th to 26th February 2022.

Earthquake Engineering & Vibration Research Centre

22. R. Panneer Selvam, Yamini Gupta, titled "Seismic response evaluation of electrical equipment – An approach for resilient power system", in the 5th World Congress on Disaster Management WCDM 2021 held at IIT, Delhi, on 24th & 25th November 2021.

23. T. Nagender, Y.M. Parulekar, R. Panneer Selvam, J. Chattopadhyay, titled "Experimental study and numerical simulation of seismic behavior of corroded reinforced concrete frames" in the Science Direct during September 2021.

24. R. Panneer Selvam, Yamini Gupta & D. Nagesh Babu, titled "Failure Analysis of Electrical Equipment under Operational Vibration" in the CPRI Journal, Volume No.17, Issue No.1 /37-43 , January-June 2021.

Energy Efficiency & Renewable Energy Division

25. Prashob S, N. Rajkumar, R. Sudhir Kumar, titled "Identifying Variation in Noise Levels of Rotating Electrical Machines for Design Improvement", in the 10th edition of Virtual International Conference & Exposition on Electrical Rotating Machines, Drives & Applications conducted by IEEMA, Mumbai, from 6th to 8th, September 2021 (Online mode).

26. Jeykishan Kumar K, Jothibasu S, titled "Performance of Off-Grid Solar Based Agricultural Water Pump Controller", in International IEEE Conference The Annual Canadian Electrical Power and Energy Conference (EPEC2021) organized by IEEE Toronto Section, Canada and Technically sponsored by IEEE PES, IEEE PELS, IEEE IAS Societies, in an online-virtual mode on 24th October 2021, held virtually from 22nd to 24th October 2021 and 30th & 31st October 2021.

27. Jeykishan Kumar, K., Sudhir Kumar, R., Bhattacharjee T, titled “Alternate Method for Evaluating Power-temperature Derating Characteristics of Grid Tied Solar Photovoltaic Inverter. Sādhanā 46, 117 (2021). https://doi.org/10.1007/s12046-021-01646-9 - Scopus indexed, Impact factor-1.9.

28. Jeykishan Kumar K., titled "Comparison of Anti-Islanding Protection in Single- and Three-Phase Solar Grid-Connected String Inverters", in the Journal of The Institution of Engineers (India): Series B on 23rd June 2021 (Article link-https://doi.org/10.1007/s40031-021-00635-0). Scopus indexed with Impact factor-1.2.

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High Voltage Division

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High Power Laboratory

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Materials Technology Division

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Power System Division

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RTL – Noida

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RTL - Kolkata

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UHVRL, Hyderabad

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Appendix – 10

V.K. Niranjan & Co.
Chartered Accountants

Phone : 080 - 2335 7769
Mobile : +91-87624 42895

No. :

INDEPENDENT AUDITOR'S REPORT

To,
The Governing Council
Central Power Research Society
Bangalore.

Report on the financial statements

Opinion

We have audited the accompanying financial statement **of CENTRAL POWER REASEARCH INSTITUTE** ("the Society"), which comprise the balance sheet as at March 31, 2022, the Income and Expenditure Account for the year then ended of the Society 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 **Emphasis of matter** paragraph, the financial statements have been properly prepared.

a. In the case of the Balance sheet, of the state of the affairs of the Society as at March 31,2022. 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 for Opinion

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 Company in accordance with the Code of Ethics issued by the Society 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 **opinion**.

1049, "Maria Arcade" Dr. Rajkumar Road, 4th 'M' Block, Rajajinagar,
Opp. to SJR High School, BENGALURU - 560 010.
E-mail: vkniranjan_co@yahoo.com
Branches : • Coimbatore Tamilnadu • Tiruvalla Kerala

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 Emphasis of Matter 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 Society as at March 31st, 2022 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 Society need 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) CPRI has invested Superannuation fund with M/s LIC of India to the extent of Rs.787.80 Crores for the year ended 31.03.2022 with current year provision of Rs.40 crores. CPRI has received two Actuarial valuation reports as follows.

   a. Estimation received from M/s Transvalue Consultants is Rs.901.98 Crores.
   b. Estimation received from M/s LIC of India is Rs.687.73 Crores.

   Hence the surplus for the year has been overstated Rs. 114.18 Crores (as per M/s Transvalue Consultants valuation) and excess provision made as per M/s LIC of India.

c) There are unknown direct remittances of Rs.7.92 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 Society has maintained CPWD schedule for having completed certain civil works from 2017-18 till 2021-22. 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.33.33 Crores Certain projects are short closed during the period. 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.

Responsibility Management and those charged with Governance for the financial statements

The Management of the Society 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 Society 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 Society'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 Society'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.

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 "Emphasis of matters" paragraph
b) In our opinion, proper books of account as required by law have been kept by the Society 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 **V.K.Niranjan & Co.,**
Chartered accountants
ICAI Firm Regn. No. 002468S

(V.K.Niranjan)
Partner
Membership No: **021432**
UDIN: 22021432ANVUTN9860

Place: Bengaluru
Date: 29-07-2022

CENTRAL POWER RESEARCH INSTITUE, BANGALORE.

BALANCE SHEET AS AT 31ST MARCH 2022

(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	12,67,94,56,489	12,36,68,57,501
Reserves and Surplus	2	90,96,55,758	1,03,45,81,330
Earmarked and Endowment Funds	3	11,72,93,60,124	10,87,43,20,447
Grants from Government of India	4	2,06,15,70,625	1,33,27,85,467
Current Liabilities and Provisions	5	1,15,68,93,179	94,27,78,928
TOTAL		**28,53,69,36,174**	**26,55,13,23,673**
Assets			
Fixed Assets	6	12,37,54,56,486	12,06,28,57,499
Investments from Earmarked & Endowment Funds	7	10,60,98,72,346	10,07,02,71,405
Current Assets, Loans and Advances	8	5,55,16,07,341	4,41,81,94,769
TOTAL		**28,53,69,36,174**	**26,55,13,23,673**
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 V.K.Niranjan & Co.,
Charted Accountants
FRN:0024688

Bangalore
29-07-2022

(C.S. Murali Krishna)
Chief Accounts Officer

(V.S Nandakumar)
Director General

(V.K.Niranjan)
Partner
Membeship No. 021432

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2022

(Amount in Rs.)

INCOME	Schedule	Current Year	Previous Year
Income from Test Fee & Consultancy	9	120,91,17,366	127,26,24,326
Fees	10	74,63,285	44,03,542.00
Interest Earned	11	8,23,46,054	8,91,16,640
Other Income	12	1,49,40,953	12,77,27,576
TOTAL (A)		**131,38,67,658**	**149,38,72,084**
EXPENDITURE			
Research Establishment Expenses	13	73,62,31,639	95,04,98,754
Research Administrative Expenses	14	25,59,73,265	25,73,02,384
Depreciation and Provision for doubtfull debts	15	27,92,11,027	26,14,94,303
TOTAL (B)		**127,14,15,931**	**146,92,95,440**
Balance being excess of Income over Expenditure (A-B)		4,24,51,727	2,45,76,644
Add:			
Opening Balance of General Reserve Account		15,73,94,691	14,36,25,286
Less:			
Assets directly acquired out of General Reserve		-	17,10,194
Assets (Non Plan) acquired transferred to Capital Reserve		62,38,841	90,97,045.00
Tr. To SAF from OB of GR		15,00,00,000	
CLOSING BALANCE OF GENERAL RESERVE		**4,36,07,577**	**15,73,94,692**
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 V.K.Niranjan & Co.,
Charted Accountants
FRN:002468S

Bangalore
29-07-2022

(C.S. Murali Krishna)
Chief Accounts Officer

(V.S Nandakumar)
Director General

(V.K.Niranjan)
Partner
Membership No. 021432

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2022

(Amount in Rs.)

	SCHEDULE 2	Current Year		Previous Year	
	RESERVES AND SURPLUS				
A	**GENERAL RESERVE**				
	As per last Account	15,73,94,691		14,36,25,286	
	Add: Surplus during the year	4,24,51,727		2,45,76,644	
	Less: Assets directly acquired out of General Reserve	-		17,10,194	
	Less: Assets (Non Plan) acquired transferred to Capital Reserve	62,38,841		90,97,045	
	Less: Transf. to SAF	15,00,00,000			
	Net Balance A		**4,36,07,577**		**15,73,94,691**
B	**Reserve for Capital Expenditure out of CPRI generated funds**				
	Opening Balance	83,51,75,018		84,55,79,882	
	Add: Provision / contribution made during the year	(1,71,00,000)		0	
	Less: Utilisation during the year	-1,26,97,491		1,04,04,864	
	(101369651-114067142)				
	Net Balance B		**83,07,72,509**		**83,51,75,018**
C	**MAINTENANCE, RENEWAL & OBSOLESCENCE RESERVE**				
	Opening Balance	4,09,57,677		5,28,90,117	
	Add: Interest earned	20,92,205		21,54,715	
	Less: Utilisation during the year	87,72,311		140,87,155	
	Sub Total	3,42,77,571		**409,57,677**	
	Add: Security Deposit	9,98,100		8,97,781	
	Statutory Liabilities	-		1,56,163	
	Net Balance B		**3,52,75,671**		**4,20,11,621**
	TOTAL (A+B)		**90,96,55,758**		**103,45,81,330**

Place : Bangalore,
Date: 29-07-2022

V.K. NIRANJAN & CO Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2022

(Amount in Rs.)

	SCHEDULE 3:	Current Year		Previous Year	
	EARMARKED & ENDOWMENT FUNDS:				
A	**SUPERANNUATION FUND**				
	Opening Balance	747,79,66,977		701,18,07,255	
	Add: Contribution during the year	29,79,00,000		40,35,00,000	
	Add: Interest earned	46,05,61,922		43,50,22,214	
	Less: Utilisation for Pension payments	35,84,99,634		37,23,62,492	
	Sub Total	**787,79,29,265**		**747,79,66,977**	
	Add: Security Deposit	13,25,271		25,56,942	
	Net Balance - A		**787,92,54,536**		**748,05,23,919**
B	**PROVIDENT FUND**				
	Opening Balance	38,55,44,150		39,43,75,193	
	Add: Subscriptions & Repayments	7,00,20,444		7,31,65,746	
	Add: Interest Paid / Credited to PF subscribers	2,66,65,376		2,45,41,327	
	Less: Final Settlement Withdrawals	-2,81,67,968		7,04,72,314	
	Less: Withdrawals	-3,54,44,733		3,60,65,802	
	Sub Total	**41,86,17,269**		**38,55,44,150**	
	Add: Balances under Security Deposit etc.,	79,454		79,454	
	Opening Balance (Additional Interest)	4,54,95,057		4,04,31,503	
	Add: Additional Interest earned (Excess of Interest Paid over interest earned	30,09,316		50,63,554	
	Total	4,85,04,373		4,54,95,057	
	Net Balance - B		**46,72,01,096**		**43,11,18,661**
C	**NEW PENSION SCHEME FUND**				
	(i) Opening Balance (Employee's Contribution)	24,920		24,920	
	Add: Subscriptions/Employees' Contribution	-		-	
	Add: Interest on Employees' Contribution (cumulative)	18,878		18,878	
	(ii) Opening Balance (Employer's Contribution)	24,919		24,919	
	Add: Interest on Employer's Contribution (cumulative)	18,878		18,878	
	Sub Total	**87,595**		**87,595**	
	Add: Additional Interest earned	1,89,312		1,76,110	
	Add: Balances under Security Deposit etc.,	16,782		16,782	
	Net Balance - C		**2,93,689**		**2,80,487**
D	**DEPRECIATION FUND**				
	Opening Balance	282,33,42,642		238,73,14,630	
	Add: Depreciation During the year	26,92,11,027		26,14,94,303	
	Sub Total	309,25,53,669		264,88,08,933	
	Add: Interest received	6,32,21,088		8,69,32,608	
	Add: Interest accrued	7,09,69,952		8,76,01,101	
	Less: Utilization During the year	-47,26,517		-	
	Net Balance - D		**322,20,18,193**		**282,33,42,642**
E	**OTHER FUNDS**				
	(i) Sponsored Scheme Deposits		9,98,64,074		8,61,64,652
	(ii) IHRD Scheme Deposits		6,07,28,533		5,28,90,086
	TOTAL (A+B+C+D+E)		**1172,93,60,124**		**1087,43,20,447**

Place: Bangalore
Date: 29/07/2022

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2022

(Amount in Rs.)

		SCHEDULE 4	Current Year		Previous Year	
		GRANTS FROM GOVT. OF INDIA, & OTHERS				
A		Under Non-recurring Grant-in aid				
		Opening Balance	120,88,91,934		91,09,08,287	
		Add: Grant received during the year	110,00,00,000		70,00,00,000	
		Less: Grant utilised during the year	28,36,76,826		40,20,16,353	
		Grant Balance		202,52,15,108		120,88,91,934
B		Under R&D Schemes Grant-in-Aid				
	(i)	Under IHRD Schemes				
		Opening Balance	12,07,77,518		4,64,22,847	
		Add: Grant received during the year	-		7,54,33,671	
		Less: Grant utilised during the year	2,25,76,000		10,79,000	
		Less: Tra. To NPP	9,68,41,001			
		Grant Balance		13,60,517		12,07,77,518
	(ii)	Under RSoP Scheme				
		Opening Balance	23,19,074			
		Add: Grant received during the year	7,46,20,000		2,41,84,747	
		Less: Grant utilised during the year	6,78,46,000		2,41,84,747	
		Add: Unspent balance received	14,54,124		23,19,074	
		Less: Grant refunded to M o P during the year	37,73,198			
		Grant Balance		67,74,000		23,19,074
	(iii)	Under NPP Scheme				
		Opening Balance	7,96,940		1,62,89,369	
		Add: Grant received during the year	2,53,81,000			
		Less: Grant utilised during the year	8,65,01,000		2,37,88,370	
		Add: Unspent balance received			82,95,941.00	
		Less: Grant refunded to M o P during the year	82,96,941			
		Add: from IHRD	9,68,41,001			
		Grant Balance		2,82,21,000		7,96,940
		TOTAL		**206,15,70,625**		**133,27,85,467**

Place : Bangalore,
Date : 29/07/2022

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE

Schedules forming part of Balance Sheet as at 31st March 2022

(Amount in Rs.)

		SCHEDULE 5	Current Year		Previous Year	
		CURRENT LIABILITIES AND PROVISIONS				
		CURRENT LIABILITIES				
	1	**Sundry Creditors**				
		a) For Supplies & Services	5,16,81,355		94,04,118	
		b) For Expenses	(16,59,935)		2,75,00,655	
		c) For Salaries	4,95,86,160		4,47,47,427	
		d) For Others	6,46,40,169		5,47,39,692	
		e) Interest received on Grant Account to be refunded to M o P	-		19,05,064	
				16,42,47,749		13,82,96,956
	2	**Deposits Received**		80,62,27,342		67,01,79,349
	3	**Statutory Liabilities**		8,08,74,549		3,93,39,666
	4	**EMD, Security Deposits and others**		9,55,43,539		9,49,62,957
	5	**Reserve for Doubtful debts**		1,00,00,000		-
		TOTAL		**115,68,93,179**		**94,27,78,928**

Place: Bangalore,

Date : 29-07-2022

V.K. NIRANJAN & CO Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2022

(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 (EC-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	119,71,68,187	-	-	-	14,06,97,149	133,78,65,336	119,71,68,187
3	PLANT MACHINERY & EQUIPMENT	694,79,32,829	60,89,490	2,33,94,048			697,74,16,367	694,79,32,829
4	VEHICLES	55,81,762	-	-			55,81,762	55,81,762
5	FURNITURE, FIXTURES	3,30,80,364	1,49,351	-			3,32,29,715	3,30,80,364
6	LIBRARY BOOKS & FILM	1,55,45,927	-	-		-	1,55,45,927	1,55,45,927
7	MACHINERY & EQUIPMENTS (SPONSERED PROJECTS)	35,68,18,941		1,19,86,764		-	36,88,05,705	35,68,18,941
	TOTAL (A)	**862,58,12,870**	**62,38,841.00**	**3,53,80,811**	**-**	**14,06,97,149**	**8,80,81,29,671**	**8,62,58,12,869**
B	CAPITAL WORK-IN-PROGRESS	328,18,19,457	16,96,09,684		11,40,67,142	(14,06,97,149)	342,47,99,134	328,18,19,457
	CAPITAL WORK-IN-PROGRESS (CPRI GRANT PORTION)	15,52,25,172	10,13,69,651		-11,40,67,142		14,25,27,681	15,52,25,172
	TOTAL (B)	**3,43,70,44,629**	**27,09,79,335**	**-**	**-**	**(14,06,97,149)**	**3,56,73,26,815**	**3,43,70,44,629**
	GRAND TOTAL	**1206,28,57,499**	**27,72,18,176**	**3,53,80,811**	**-**	**-**	**1237,54,56,486**	**1206,28,57,499**

Place : Bangalore,
Date : 29-07-2022

V.K. NIRANJAN & CO. CA F.R. No. 002468S 2335 1769 8762442895 Bengaluru-10 Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2022

(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	7,55,94,89,198	703,61,31,271
2	Claims Receivables	8,09,000	8,09,000
3	Cash at Bank (S.B. Account No.10356553751)	2,11,09,163	4,00,83,648
	Total - A	**758,14,07,360**	**707,70,23,919**
B	**PROVIDENT FUND INVESTMENT ACCOUNT**		
1	In Government Securities	3,64,92,938	3,64,92,938
2	Bonds	21,50,00,000	27,50,00,000
3	Term Deposits with Banks & Financial Institutions	17,95,00,000	7,96,00,000
4	Interest Accrued on Provident Fund Investments	1,05,26,525	53,62,393
5	TDS Receivables	20,80,000	
6	Receivable from HO & CRTL	93,60,000	
7	Cash at Bank (S.B. Account No.10356553740)	1,34,50,509	346,63,329
	Total - B	**46,64,09,973**	**43,11,18,661**
C	**NEW PENSION SCHEME FUND INVESTMENT ACCOUNT**		
1	Deposit with Bank	2,93,689	2,80,487
	Total - C	**2,93,689**	**2,80,487**
D	**DEPRECIATION FUND INVESTMENT ACCOUNT**		
1	Term Deposits with Banks & Financial Institutions	1,33,91,20,479	1,36,42,47,238
2	Bonds	1,06,75,00,000	1,11,00,00,000
3	Interest Accrued on Depreciation Fund Investments	11,43,63,513	8,76,01,101
4	Margin money deposit	3,62,00,000	
5	Bank balance	45,77,333	
		2,56,17,61,325	**2,56,18,48,339**
	Total (A+B+C+D)	**10,60,98,72,346**	**10,07,02,71,405**

Place : Bangalore
Date : 29/07/2022

V.K. NIRANJAN & CO Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2022

(Amount in Rs.)

		SCHEDULE 8	Current Year		Previous Year	
		CURRENT ASSETS, INVESTMENTS, LOANS & ADVANCES				
A		**CURRENT ASSETS:**				
	1	**Inventories:**				
		a) Stores and Spares		9,92,198		10,36,614
	2	**Sundry Debtors:**				
		a) Debts Outstanding for a period exceeding six months	31,63,11,859		21,69,64,914	
		b) Debts Outstanding for a period not exceeding six months	5,41,60,730	37,04,72,589	12,21,13,267	33,90,98,181
	3	**Cash balances in hand (including cheques/drafts, Imprest and Stamps)**		2,75,209		2,91,138
	4	**Deposits and Bank Balances:**				
		a) Margin Money Deposits on R&D, SPON & Revenue	2,01,38,692		35,25,000	
		b) Margin Money Deposits on Grant account	1,78,64,61,361		72,77,61,265	
		c) Deposits earmarked for Superannuation Fund	29,79,00,000		40,35,00,000	
		d) Deposits earmarked for Depreciation Fund	26,58,42,948		26,14,94,303	
		f) Capital Bank Balance (Incl. MODs)	7,88,41,368		49,75,52,527	
		g) Savings Accounts	36,91,41,531	2,81,83,25,901	56,70,31,003	2,46,08,64,098
	5	**Deposits of Maintenance, Renewal & Obsolescence Reserve**	3,40,00,000		4,00,00,000	
		Add: Savings Bank account of Maintenance, Renewal & Obsolescence Reserve	26,22,003		33,15,070	
		Add: Accrued interest on MRO Fund & TDS Receivable, etc.,	15,01,482	3,81,23,485	18,22,551	4,51,37,621
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	1,00,77,36,573			
		Margin Money with Banks against BG	3,75,33,120		3,74,29,170	
		Short Term Deposits with Banks	18,45,00,000	122,97,69,693	73,96,58,459	77,70,87,629
C		**LOANS, ADVANCES & OTHER ASSETS**				
		a) i) Deposits with Govt.Depts & others	2,54,17,756		2,55,94,258	
		ii) Deposits with Revenue Authorities (Payment under Protest)	5,68,17,271		6,05,28,260	
		b) Advances to Employees	14,05,784		41,79,419	
		c) Prepaid Expences	7,60,971		7,48,478	
		d) Accrued interest	9,83,24,977		8,64,72,938	
		e) TDS Receivables	23,53,92,289		20,19,90,318	
		f) Claims Receivables	17,26,31,981		4,85,19,678	
		g) Capital Advances	0		51,724	
		h) Other Advances	1,48,97,236		25,94,417	
		i) Deposit to NHPTL	18,40,00,000	78,96,48,265	6,00,00,000	49,06,79,489
		TOTAL		**555,16,07,341**		**441,81,94,769**

Place : Bangalore,
Date : 29-07-2022

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2022

(Amount in Rs.)

	SCHEDULE 9	Current Year	Previous Year
	INCOME FROM TEST FEE & CONSULTANCY		
a)	**Test Fee**	107,11,15,978	117,11,52,751
b)	**Consultancy Services Charges**	13,80,01,388	10,14,71,575
	TOTAL	**120,91,17,366**	**127,26,24,326**

Place : Bangalore,
Date : 29-07-2022

V.K. NIRANJAN & CO. Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2022

(Amount in Rs.)

	SCHEDULE 10	Current Year	Previous Year
	FEES		
a)	**Training Fee**	63,05,500	35,83,542
b)	**Seminar Fee**	11,57,785	8,20,000
	TOTAL	**74,63,285**	**44,03,542**

Place : Bangalore,
Date : 29/07/2022

V.K. NIRANJAN & CO. Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2022

(Amount in Rs.)

	SCHEDULE 11	Current Year	Previous Year
	INTEREST EARNED		
a)	Interest on Term Deposits with Banks & Financial Institutions	8,18,74,747	8,83,22,731
b)	Interest on Loans & Advances to Employees	4,71,307	7,93,909
	TOTAL	**8,23,46,054**	**8,91,16,640**

Place : Bangalore,
Date : 29-07-2022

V.K. NIRANJAN & CO. Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2022

(Amount in Rs.)

		SCHEDULE 12	Current Year	Previous Year
		OTHER INCOME		
1)		**Fees for Miscellaneous Services**		
	a)	Sale of Publications	4,000	13,000
	b)	Library Receipts	1,266	100
2)		**Miscellaneous Income**		
	a)	Application fee on recruitment	1,70,200	2,19,200
	b)	Sale of Tender forms	36,000	80,500
	c)	Licence fees	19,48,759	17,59,414
	d)	Rent Receipts	10,19,658	18,02,650
	e)	Sale of Scrap	68,43,794	52,44,974
	f)	Others	23,220	8,14,213
	g)	Interest Received on Income Tax Refunds	48,94,056	11,77,86,159
	h)	Provision for Doubtful Debts Realised	0	7,366
		TOTAL	**1,49,40,953**	**12,77,27,576**

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

Place : Bangalore,
Date : 29-07-2022

V.K. NIRANJAN & CO. Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2022

(Amount in Rs.)

	SCHEDULE 13	Current Year	Previous Year
	RESEARCH ESTABLISHMENT EXPENSES		
a)	**Salaries and Wages including Bonus**	56,36,94,699	52,26,85,896
b)	**Staff Welfare Expenses**	99,45,910	1,58,36,680
c)	**Expenses on Employee's Retirement and Terminal Benefits**	14,79,00,000	40,35,00,000
d)	**Expenses on Medical Facilities**	1,46,91,030	84,76,177.63
	TOTAL	**73,62,31,639**	**95,04,98,754**

Place: Bangalore,
Date : 29-07-2022

V.K. NIRANJAN & CO. Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2022

(Amount in Rs.)

	SCHEDULE 14	Current Year	Previous Year
	RESEARCH ADMINISTRATIVE EXPENSES		
a)	Electricity and Power	8,38,95,223	7,96,27,298
b)	Water Charges	7,15,962	9,28,426
c)	Office Expenses	4,16,76,112	4,31,10,807
d)	Repairs and Maintenance	13,41,49,731	12,28,04,277
e)	Rent, Rates and Taxes	12,36,467	10,30,354
f)	Vehicles Running and Maintenance Expenses	5,60,606	10,51,800
g)	Postage, Telephone and Communication Charges	20,06,393	19,00,761
h)	Printing and Stationary	7,86,861	7,62,880
i)	Travelling and Conveyance Expenses -Inland	23,08,050	4,81,132
	Travelling and Conveyance Expenses -Foreign	-	-18,584
j)	Expenses on Seminar & Workshops	7,53,075	10,86,697
k)	Subscription Expenses	-	68,000
l)	Expenses on Fees	1,54,949	1,31,320
m)	Auditors Remuneration	1,37,700	65,000
n)	Professional Charges	2,66,360	4,83,340
o)	Library Expenses	8,42,570	15,73,019
p)	Training Expences	25,21,079	1,90,328
q)	Publication Expenses	-	47,000
r)	Advertisement and Publicity	10,62,129	19,78,528
t)	Transfer to 'Reserve for Capital Expenditure' during financial year 2018-19	-1,71,00,000	-
	TOTAL	**25,59,73,265**	**25,73,02,384**

Place: Bangalore,
Date : 29/07/2022

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2022

(Amount in Rs.)

	SCHEDULE 15	Current Year	Previous Year
	Depreciation & provision for doubtful debts		
a)	**Depreciation for the year**	26,92,11,027	26,14,94,303
b)	**Provision for doubtful debts**	1,00,00,000	-
	TOTAL	**27,92,11,027**	**26,14,94,303**

Place : Bangalore,
Date : 29-07-2022

V.K. NIRANJAN & CO. Chartered Accountants

CENTRAL POWER RESEARCH INSTITUTE
Schedule forming part of Income & Expenditure for the year ended 31st MARCH 2022

SCHEDULE 15.1
DEPRECIATION

YEAR	GROSS BLOCK				DEPRECIATION							NET BLOCK	
	OB	Additions		TOTAL	%	OB not Charged to I&E	OB Charged to I&E	OB Accumulated Dep	For the Year	Total charegd 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	1,19,28,88,220	-	14,06,97,149	1,33,35,85,369	3.17	21,46,07,660	31,22,69,647	52,68,77,307	4,05,88,472	35,28,58,119	56,74,65,779	88,06,18,573	76,61,19,590
Buildings (ICICI)	42,79,967	-	-	42,79,967	3.17	3,58,374	16,28,099	19,86,473	1,35,675	17,63,774	21,22,148	26,51,868	21,57,819
Plant & Machinery	6,90,32,17,988	2,94,83,538	-	6,93,27,01,526	3.17	1,52,93,55,831	2,06,02,25,438	3,58,95,81,269	21,34,76,220	2,27,37,01,658	3,80,30,57,489	4,84,29,92,550	3,12,96,44,037
Plant & Machinery (ICICI)	4,47,14,841	-	-	4,47,14,841	3.17	55,59,645	1,69,97,757	2,25,57,401	14,17,460	1,84,15,217	2,39,74,862	2,77,17,084	2,07,39,979
Plant & Machinery (Spons)	35,58,18,942	1,19,86,764	-	36,88,05,706	3.17	2,73,85,799	6,37,03,264	9,10,89,063	1,18,13,027	7,55,16,290	10,29,02,090	29,31,15,678	26,59,03,616
Furniture & Fixtures	3,30,80,364	1,49,351	-	3,32,29,715	6.33	67,23,812	1,39,98,487	2,07,22,299	17,38,237	1,57,36,725	2,24,60,537	1,90,81,876	1,07,69,178
Vehicles	55,81,762	-	-	55,81,762	9.50	34,40,892	15,46,079	49,86,971	41,935	15,88,014	50,28,906	40,35,683	5,52,856
Library Books	1,53,20,774	-	-	1,53,20,774	95.00	-	1,45,54,735	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	2,13,895	11,258	11,258
Sub Total	**8,62,58,12,871**	**4,16,19,653**	**14,06,97,149**	**8,80,81,29,673**		**1,78,74,32,013**	**2,48,51,37,402**		**26,92,11,027**	**2,75,43,48,428**	**4,54,17,80,442**	**6,14,06,75,470**	**4,26,63,49,232**

SCHEDULE 16A
Work-in-Progress

Work-in-Progress	Opening WIP	Addition	Transfer to WIP	Transfer to FA	Closing WIP
Capital Works in Progress (M o P)	3,28,18,19,457	14,19,17,684	11,40,67,142	(14,06,97,149)	3,39,71,07,134
Capital W-I-P (CPRI)	15,52,25,172	12,90,61,651	(11,40,67,142)		17,02,19,681
Total (B)	**3,43,70,44,629**	**27,09,79,335**	**-**		**3,56,73,26,815**
TOTAL	**12,06,28,57,500**		**14,06,97,149.00**		**12,37,54,56,488**

Place: Bangalore.
Date : 29-07-2022

Schedule – 16

Significant Accounting Policies attached to and forming part of Accounts for the year ended 31st March 2022.

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. 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 **V.K.NIRANJAN & CO.,**
Chartered Accountants,
FRN :002468S

(C.S.MURALI KRISHNA)
Chief Accounts Officer

(V.S. NANDAKUMAR)
Director General

(V.K.Niranjan)
Partner
Membership No. 021432

Place: Bangalore.
Date: 29-07-2022

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.87.72 lakhs for 2021-22 (Rs.140.87 lakhs for the previous year) and Rs.1657.13 lakhs up to 2021-22.

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 conveyed approval for the project 'Augmentation of High Power Short Circuit Test facilities and establishment New Facilities Projects' for Rs.996.10 Crores. The same was revised to Rs.979.00 crores vide Ministry of Power letter No.4/1/2020-T&R dt.14-01-2022 has directed C.P.R.I. to (i) bear 10% of the total outlay of the projects i.e., Rs.97.90 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.

V.K. NIRANJAN & CO. Chartered Accountants

The total amount to be contributed by C.P.R.I. on account of above mentioned projects is Rs.108.49 Crores.(10.59+97.90) 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 31-03-2022 is Rs.83.08 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 NHPTL 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 31.03.2022 through M/s LIC of India and the liability has been estimated at Rs.68,773.00 lakhs. (Estimation received from M/s.Transvalue is Rs.90,198.00 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.

The fund balance is Rs.74,780.00 lakhs. In addition, Rs.4000.00 lakhs has been provided out of General Reserve and available in SAF surplus(interest earned – pay out during the FY 2021-22). Thus the total fund is Rs.78,780.00 lakhs.

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.23739.83 lakhs. (Rs.19752.75 lakhs for 2020-21).

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.275.33 lakhs as on 31.03.2022 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 31.03.2022 are Rs.17,864.61 lakhs (Rs.7,277.61 lakhs as on 31.03.2021).

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 V.K.NIRANJAN & CO
Chartered Accountants,
FRN :002468S

(C.S.MURALI KRISHNA)
Chief Accounts Officer

(V.S. NANDAKUMAR)
Director General

(V.K.Niranjan)
Partner
Membership No.021432

Place: Bangalore,
Date: 29-07-2022