Prof. Sir. C. V. Raman Road,
Sadashivanagar Post Office
P. B. No. 8066, Bengaluru - 560 080,
Karnataka, INDIA
Tel. : 080 - 2207 2201/ 2207 2207/
2207 2215, Fax : 080 - 2360 1213

CENTRAL POWER RESEARCH INSTITUTE

ANNUAL REPORT 2018 - 19

www.cpri.in

FOREWORD

The performance of the Institute for the year 2018-19 was noteworthy in terms of achievement against the targets, establishment of a few important facilities, special tests carried out, services offered to Indian and Foreign clients, relations with stakeholders, landmark events etc. The year 2018-19 has been a remarkable year in terms of revenue achievement. The Institute crossed Rs.200 Cr. revenue for the first time.

During the year, Central Power Research Institute (CPRI) organized many National/ International Conferences/Workshops. The details of some of them are given below:

- National Conference on "Switchgear and Controlgear", was organised at CPRI, Bengaluru by High Power Laboratory, CPRI, Bengaluru, on 6th & 7th December 2018.
- National Conference on "Recent Trends in Overhead Transmission line towers & its accessories" was organised at CPRI, Bengaluru, by Mechanical Engineering Division, CPRI, Bengaluru, on 20th & 21st December 2018.
- International Conference on High Voltage Engineering and Technology (ICHVET-2019), was organised by IEEE, Hyderabad Section in association with UHVRL-CPRI Hyderabad, at Hotel The Manohar, Old Airport Exit Road, Begumpet, Hyderabad on 7th & 8th February, 2019.
- 10th International Conference on Power Cable Technology titled "CABLETECH 2019", was organized at CPRI, Bengaluru, by Cables and Diagnostic Division, CPRI, Bengaluru, on 27th & 28th February 2019.

CPRI has been fortunate to get a large chunk of 12th Five Year Plan funding to the extent of Rs.1182.00 crores for the four major capital projects. These projects are under implementation and will pave way for upgrading CPRI test facilities to the global level. CPRI will be geared up for rendering advanced research and the state-of-the-art testing services in the years to come. Important facilities proposed under these projects are:

- Additional Short Circuit Generators for High Power Laboratory, Bengaluru (Enhancing the capacity from 2500 MVA to 7500 MVA)

- On-line short circuit test facility at Ultra High Voltage Research Laboratory-CPRI, Hyderabad
- Modern Tower Testing Facility (upto 1200kV rating towers) at UHVRL-CPRI, Hyderabad
- Establishment of Regional Testing Laboratory at Nashik
- Relocation of Thermal Research Centre-CPRI, Nagpur
- Temperature rise test (40 kA) facility at High Power Laboratory-CPRI, Bengaluru
- Enhancement of Oil test facilities & Energy meter test facilities
- Smart Grid and Phasor Measurement Unit Laboratory

The performance of the Institute with regard to set parameters, was all time high despite prevailing slump in the manufacturing sector. The total receipts for the year was Rs. 204.49 crores compared to the last year's figure of Rs.191.05 crores. The officers of CPRI have published/presented a total of 235 technical papers including 134 papers in the International Conferences & Journals. The events numbering 70 organized by CPRI under Conferences/ Seminars/Workshops/Training Programmes will pave a long way in dissemination of research outcomes among the scientific community. The research projects undertaken at the Institute have resulted in filing of 2 patents during the year.

CPRI was awarded the prestigious TOLIC RAJ BHASHA SHIELD - FIRST under the TOLIC Shield Scheme for its outstanding performance in the implementation of Progressive use of Official Language during the year 2017-18.

CPRI is also in the process of establishing new Test Centres for Distribution Transformers and Energy Meters in its bid to provide testing services with better access to Electrical manufacturers and Power Utilities in various regions.

On the consultancy front, CPRI has been carrying out the largest number of Third Party Protection Audits for Power Grid Corporation of India Ltd., UPPTCL, Pragathi Power Station, Adani Electricity Mumbai Limited, in a big way. The Institute is taking a lead in the Smart Grid area at the National Level through Smart Grid Task Force & National Forum on Smart Grid and also offering consultancy services to TSSPDCL (Telangana Utility), and Puducherry Electricity Department,Puducherry. In addition, CPRI is carrying out pollution mapping with reference to transmission systems in Eastern & Southern regions.

CPRI aspires to be the best laboratory in the world and this would happen with the active and continued support of Ministry of Power, Governing Council and Employees of the Institute.

With the support of Ministry of Power, Government of India, valued customers from India & Overseas, Central & State Utilities and PSU's, CPRI has rendered 59 years of Quality Service to the Electrical Industry since its inception i.e., 1960 and now entering into it's Diamond Jubilee Year, with an assurance of providing the best service to the fraternity of Electrical Industry.

(V. S. Nandakumar)
Director General

Contents

The Members of CPRI Governing Council as on 31st March 2019

Shri Ajay Kumar Bhalla, IAS
President
Secretary to the Govt. of India
Ministry of Power
Shram Shakti Bhawan,
Rafi Marg, New Delhi - 110 001

Shri Prakash S Mhaske
Vice President
Chairperson (I/c.)
Central Electricity Authority
Sewa Bhawan, R.K.Puram,
New Delhi – 110 066

MEMBERS

Shri Sanjiv Nandan Sahai, IAS
Additional Secretary
Ministry of Power,
Shram Shakti Bhawan, Rafi Marg
New Delhi - 110 001

Shri Vivek Kumar Dewangan, IAS
Joint Secretary & F.A.
Ministry of Power
Shram Shakti Bhawan, Rafi Marg
New Delhi - 110 001

Shri Raj Pal, IES
Economic Adviser
Ministry of Power,
Shram Shakti Bhawan, Rafi Marg
New Delhi - 110 001

Shri Prakash S Mhaske
Member (Power Systems)
Central Electricity Authority
Sewa Bhawan, R.K.Puram
New Delhi – 110 066

Shri Sandesh Kumar Sharma
Member (Planning)
Central Electricity Authority
Sewa Bhawan, R.K.Puram,
New Delhi – 110 066

Dr. Shekhar C Mande
Secretary, DSIR
Ministry of Science & Technology
Technology Bhawan, New Mehrauli Road
New Delhi - 110 016

Shri Ramesh Abhishek, IAS
Secretary
Ministry of Commerce & Industry
Dept. of Industrial Policy &
Promotion, Room No. 157, Udyog
Bhawan, New Delhi - 110 011

Shri Anand Kumar, IAS
Secretary
Ministry of New & Renewable Energy
Block-14, CGO Complex
Lodhi Road
New Delhi-110 003

Shri Atul Sobti
Chairman & Managing Director
Bharat Heavy Electricals Ltd.
BHEL House, Siri Fort
New Delhi - 110 049

Shri Gurdeep Singh
Chairman & Managing Director
NTPC Ltd., NTPC Bhawan,
SCOPE Complex, 7, Institutional Area
Lodhi Road, New Delhi - 110 003

Chairman & Managing Director
Power Grid Corporation of India Ltd.
'Saudamini', Plot No. 2, Sector 29,
Gurgaon, Haryana - 122 001

Shri Harish Agarwal
President-IEEMA
Corporate Office, Rishyamook Building,
First Floor, 85 A, Panchkuian Road
New Delhi – 110 001

Shri V. K. Kanjlia
Secretary
Central Board of Irrigation & Power
Malcha Marg, Chanakyapuri
New Delhi - 110 021

Shri Pratyaya Amrit, IAS
Chairman-cum-Managing Director
Bihar State Power Holding Company Ltd.
1st Floor, Vidyut Bhawan, Bailey Road
Patna – 800 001

The Chairman Discoms
C/o Jaipur Vidyut Vitran Nigam Ltd.
Vidyut Bhawan, Jyoti Nagar
Jaipur – 302 005, Rajasthan

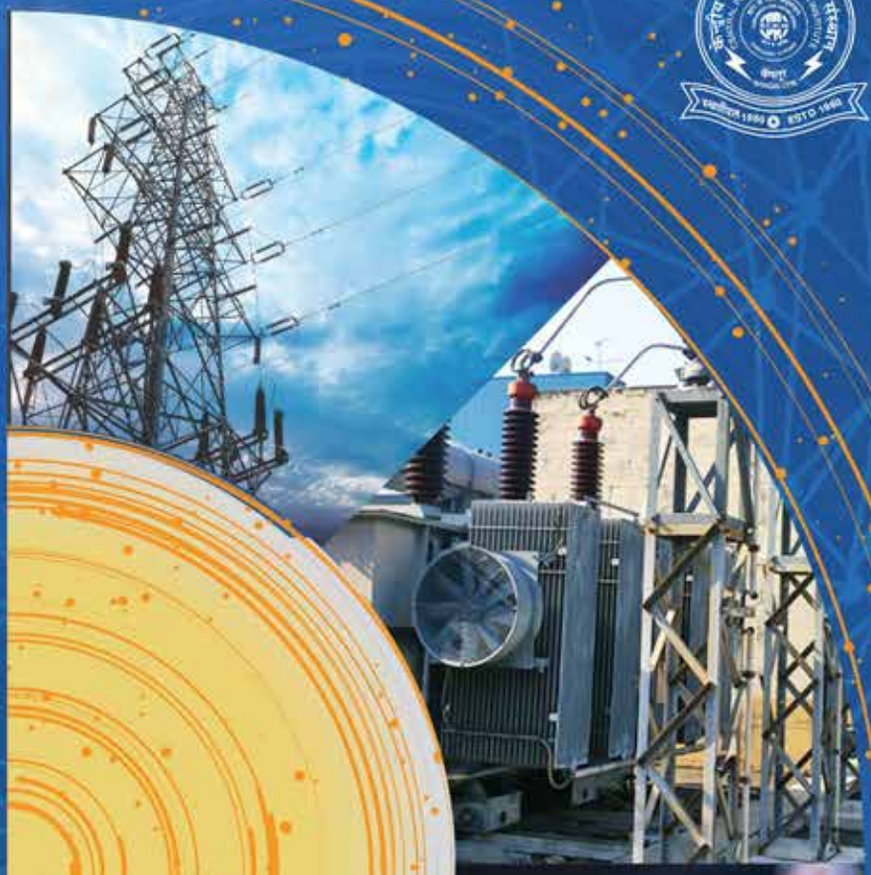
Prof. Dr. Bhim Singh
Department of Electrical Engg.,
Room No. II/118, Hauz Khas
Indian Institute of Technology, Delhi
New Delhi – 110 016

Prof. Dr. V. Jagadeesh Kumar
Department of Electrical Engg.,
Indian Institute of Technology
Madras, IIT P.O., Chennai – 600 036

Prof. Gautam Biswas, FNA
Director
Indian Institute of Technology - Guwahati
Guwahati – 781 039

Shri Abhay Bakre
Director General,
Bureau of Energy Efficiency
4th floor, Sewa Bhawan
Ramakrishna Puram
New Delhi – 110 066

Shri V. S. Nandakumar
Member - Secretary / Director General
Central Power Research Institute
Post Box No. 8066
Bengaluru–560 080



CENTRAL POWER RESEARCH INSTITUTE

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SECTION-I

ORGANIZATIONAL SET-UP

ORGANIZATIONAL 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 was 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 any 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 objects.
- Maintain a research and reference Library.

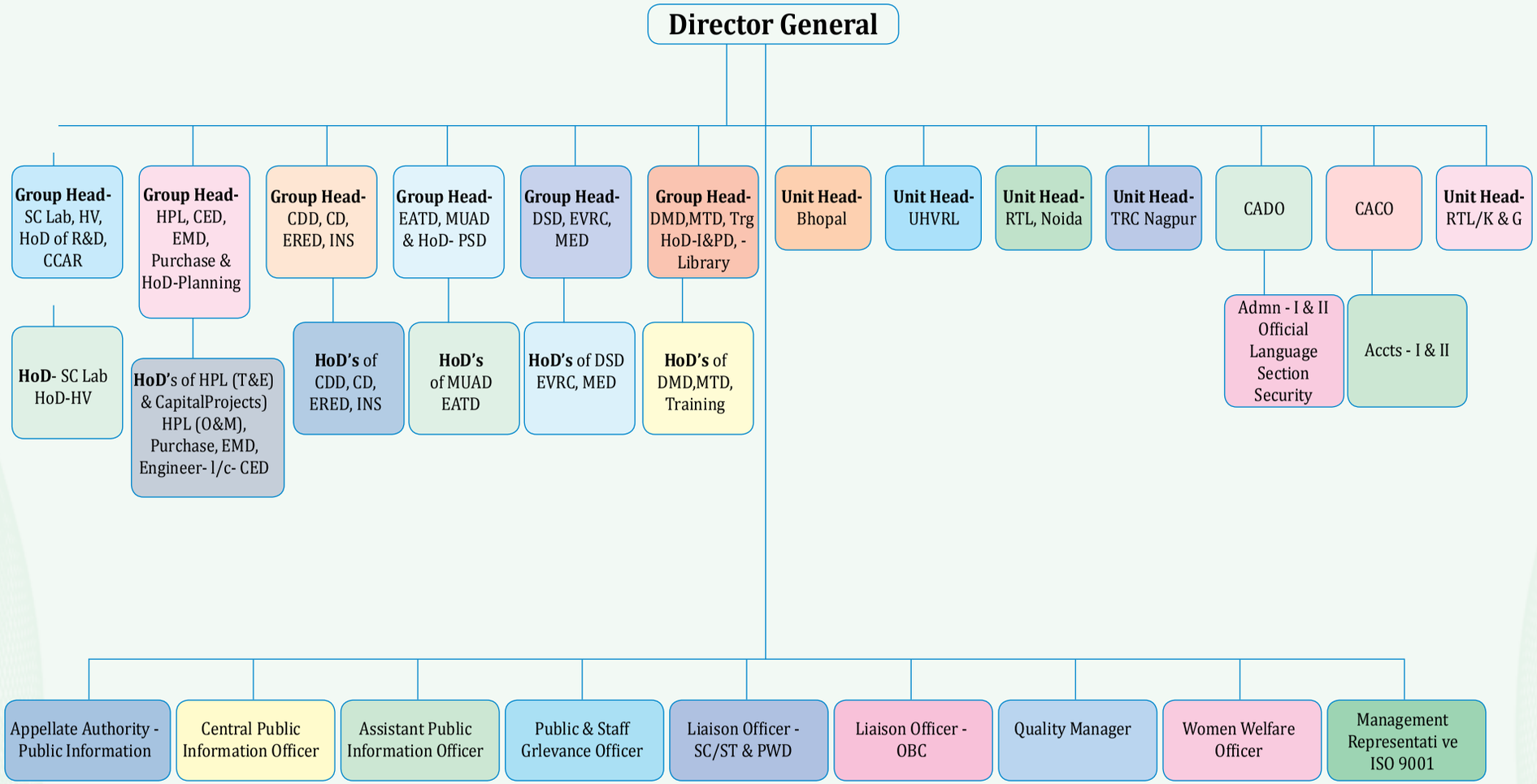
Management

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 organizations 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 2019



Central Power Research Institute Bengaluru and its Units

Central Research & Testing Laboratory (CRTL), Bengaluru

Centre for Collaborative & Advanced Research (CCAR)

Established in 2006, this Centre works to facilitate and promote advanced research, there by helping the power sector to derive the benefits of latest technology.

The main objectives of the centre are to:

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

Cables & Diagnostics Division

This division has facilities for carrying out R&D work 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.

Activities:

- Testing
- Consultancy
- Research & Development

Laboratories:

- Power Cables Laboratory
- Diagnostics Laboratory

Power Cables Laboratory

This Laboratory offers consultancy on:

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

Carries out Research & Development on:

- Development of HV DC Cables and.
- Characterization of the unwanted fire by determining the various parameters like Rate of heat release, Rate of heat release per unit area, Mass loss rates Time-to ignition, Effective heat of combustion, Rates of release of toxic gas, Critical ignition flux

600kV, 4200 kVA Outdoor Transformer

Diagnostics Laboratory

The 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 following substation/ power plant electrical equipment:

- Turbo Generators & associated electrical system
- Hydro generators & associated electrical system
- HV Motors
- Power Transformers & HV Bushings
- Switchyard equipments like CT's, CVT's, PT's, LA's
- Power Cables
- Resin cast CT's/PT's

The diagnostic field tests include the following:

Product /Apparatus & Tests:

R & D Capabilities:

The laboratory has experience & expertise to carry out detailed functional evaluation on various insulation systems like,

- Paper – oil insulation system
- Power Cable insulation system
- Rotating Machine insulation system
- Study on Static Electrification in large Power Transformers
- Investigations on Partial discharge and other diagnostic measuring techniques on Power equipment in service.
- Frequency domain Diagnostic technique to evaluate the extent of insulation degradation in Power equipment in service (HV Dielectric Spectroscopy)

Partial Discharge test on 110 MW Turbo Generator

ELCID Test on Hydro Generator

Power Capacitors Laboratory

Power Capacitors Laboratory of CPRI, Bengaluru has established state-of-the-art facilities to cater to the test requirements of Capacitor Manufacturers within the country and abroad. Research, Testing and Evaluation of Power Capacitors which have applications as shunt capacitors, series capacitors, surge protection capacitors, motor capacitors, fan capacitors, fluorescent capacitors are carried out as per National and International Standards. Also developmental tests as per Customers' requirement is 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 are 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. The general ratings covered for testing are 3-phase 440 V APFC panels of output ratings 25 kvar, 75 kvar, 150kvar, 200 kvar, 350 kvar, 375 kvar, 400 kvar, 450 kvar, 500 kvar, 800 kvar. Any other in-between ratings can also be tested.

Environmental tests

Environmental tests are carried out on various electrical and non electrical equipment / components / materials as per IEC 62271-100, IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30, IEC 60068-2-78, TEC-QM 333, etc.

Research and Consultancy

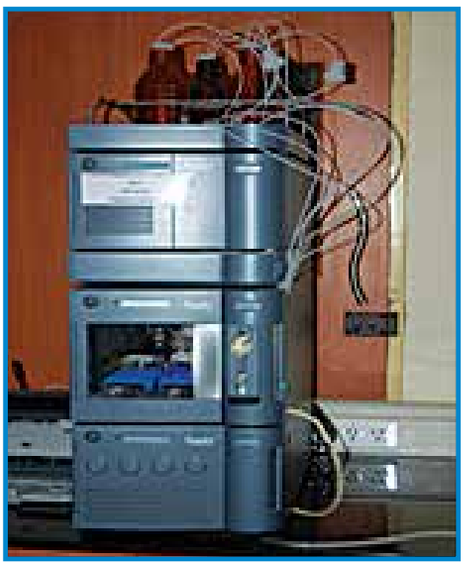
The Division undertakes R&D in the following areas:

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.

A view of Power Capacitors Laboratory

4. Selection of appropriate type of Low Voltage capacitors for Low Voltage distribution system.
5. Review of Specification for High Voltage and Low Voltage capacitor banks
6. Root cause analysis of premature failure of capacitors
7. This Laboratory offers Consultancy and field engineering services for On-Line partial discharge measurement on power transformers in services.

Dielectric Materials Division (DMD)



This Division has comprehensive evaluation facilities for insulating materials and systems. The insulating materials are evaluated and tested for electrical, mechanical, physical and electro- chemical and thermal properties.

This division has the following laboratories:

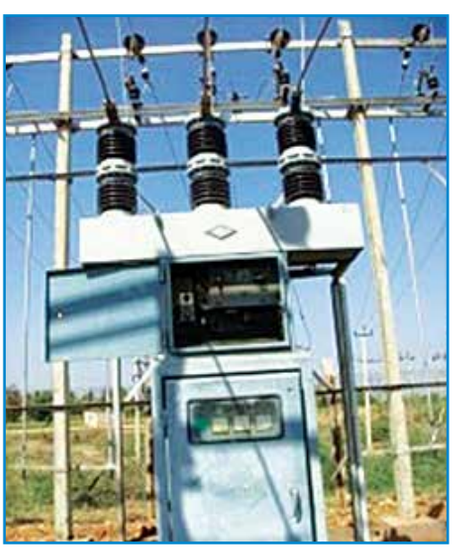
- Liquid Dielectrics Laboratory
- Polymer Laboratory
- Lubricating Oil Laboratory

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

The Polymer Laboratory has well-experienced technical personnel to advise the polymer industries on setting up plants, process improvement, etc. 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, and heaters, refrigerators, air-conditioners, battery 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 and other generating stations as per national and international standards. In addition, this centre offers consultancy services in checking the design adequacy of Structures/Substations, Railways for seismic qualification.

The Division is equipped with a Triaxial shake table of 3m x 3m size and 10 ton pay load capacity for simulating earthquake vibrations. In addition, has Electrodynamic Shaker System for carrying vibration tests on products and assemblies.

Energy Efficiency & Renewable Energy Division (ERED)

This division undertakes energy audit, energy conservation and field engineering services of power plants. This division also provides interdisciplinary field study packages to thermal power stations and process industries on remaining life estimation,

renovation modernization, and up-gradation and life extension of components, sub-systems and plants. The division, is accredited by Bureau of Energy Efficiency (BEE) and Petroleum Conservation Research Association (PCRA) for conducting energy audit in power plants and other units.

The laboratory has facilities for evaluating and certifying the following:

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

High Voltage Division (HVD)

This division has facilities for evaluating the performance & certifying high voltage electrical equipment and investigating the problems in the area of HV & EHV transmission of electric power. The laboratory conducts performance evaluation of equipments like Power Transformers, Potential Transformer, 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:

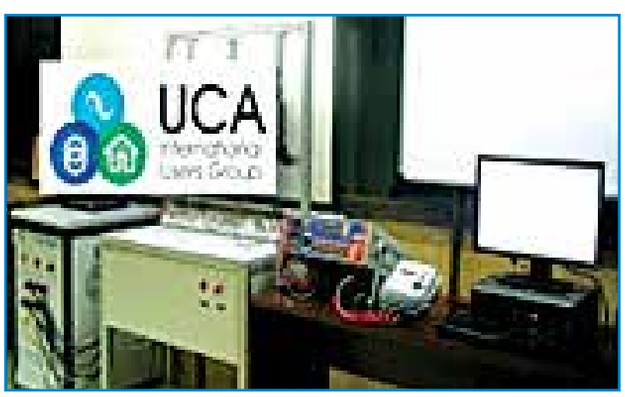
- Direct testing facility up to 2500 MVA, 72.5 kV, 3-Phase and 1400 MVA, 245 kV, Single Phase
- Synthetic testing facility for extra High Voltage Circuit Breakers rated up to 400 kV, 63 kA

Metering & Utility Automation Division (MUAD)

This Laboratory undertakes Type Testing of Electro-Mechanical and Electronic meters of accuracy 0.2 to 2.0 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 boasts of a unique state-of-the-art communication protocol laboratory with facility to test the energy meter and substation communication equipment as per the IEC/ MODBUS/ DNP protocol standards.

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

Insulation Division

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

Laboratories under this Division are:

- Solid Dielectrics Laboratory
- Heat Run Test Laboratory

Solid Dielectrics Laboratory has comprehensive, testing and evaluation facilities for solid insulating materials and systems. Insulating materials are evaluated and tested for electrical, mechanical, physical and electro-chemical properties. This laboratory has undertaken

consultancy work and sponsored projects for many power utilities and industries. Assistance has been rendered to BIS, in formulation of various standards on enamelled winding wires and insulating materials & systems.

Cyclic Corrosion Test Equipment

Weathering using Xenon Arc Lamp

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

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

1. LT Panel

2. Isolated Phase Bus Duct

3. Isolator

Materials Technology Division (MTD)

This Division has the following Laboratories for evaluating 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

Application Laboratory

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

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

Mechanical Engineering Division (MED)

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

The Laboratories operating under this Division are:

- Prototype Tower Testing Station
- Model Tower Testing Laboratory
- 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:

PMU Calibrator

- Calibration and Testing of PMU (Phasor Measurement Unit) as per IEEE C37.118.1-2011, IEEE C37.118.1a-2014 standards and

IEEE Synchrophasor Measurement Test Suite specification -2015 (version 2) with the pre-loaded suite of required tests and also performs custom testing by simulating static and dynamic conditions that a PMU can experience in a power grid to verify operation in ways not specifically required by the standard.

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 customised 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, the capital city of Madhya Pradesh, has two main testing stations for conducting Short Circuit tests. They are:

STATION I:

Direct Short Circuit Test Station of 1250 MVA capacity at 12 kV 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 three single phase circuit. 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 evaluation and certification of EHV circuit breakers, power transformers, isolators, line (wave) traps, reactors, insulator strings etc., for performance evaluation 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 switchgear in addition to the 1500 MVA short circuit alternator and Energy Meter Evaluation Laboratory.

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 are conducted at the following Laboratories:

- Temperature Rise Test Laboratory.
- ELCB, MCB, MCCB, RCCB, Contactors and Fuse Test Laboratory.
- Ingress Protection Test Laboratory.
- High Voltage Laboratory (for dry/wet power frequency and lightning impulse).
- CT and PT Test Laboratory.
- Partial Discharge Laboratory.
- Mechanical and Electrical Endurance Test Laboratory: These facilities are in the process of continuous up-gradation to meet newer test requirements. These laboratories also conduct type tests, besides pre & post short circuit supplementary tests.

Other Facilities:

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

Regional Testing Laboratory (RTL), NOIDA

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

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

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 HVDC transmission line research as well as facilitate 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

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

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SECTION-2

RESEARCH & DEVELOPMENT

RESEARCH & DEVELOPMENT

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

A. Projects under R&D Schemes of MoP being implemented through CPRI

   i. In-house Research Projects (IHRD)
   ii. Research Scheme on Power (RSoP) Projects
   iii. R&D Under National Perspective Plan (NPP)
      a. Project administered by CPRI
      b. Project under Uchhatar Avishkar Yojana (UAY)
      c. Project under Impacting Research Innovation and Technology (IMPRINT)

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

Procedure for screening, review and approval of Project Proposals: CPRI has a comprehensive review and approval mechanism of the proposals received under the R&D Schemes to avoid any overlapping of research done under other schemes of Govt. of India. 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 Perspective Plan. The thrust areas of research for the next 3-4 years for the Indian Power Sector have been identified by a High Level Committee constituted under the Chairmanship of Secretary (P) for assessment and review of R&D activities of Organization/PSUs under the Ministry of Power. The proposals are then sent to two domain experts for review of the research content and to evaluate the technical feasibility. Based on the comments, the proposals are put up to a Technical Committee (TC) for recommendation. At present there are four TCs viz. TC on "Hydro", TC on "Thermal", TC on "Transmission" and TC on "Grid Distribution & Energy Conservation" Research. The TCs are chaired by eminent Professors from IITs. The proposals recommended by the TC are put up for consideration of DG, CPRI/the Standing Committee on Research and Development (SCRD). The SCRD is chaired by Chairperson, Central Electricity Authority, New Delhi and has representations from Academia, Industry and 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 chaired by Secretary (Higher Education), MHRD and with members from the participating Ministries has been constituted for approval of the proposals and monitoring the progress of implementation. The Apex Committee has the authority for financial sanction and financial closure of the projects. The National Co-ordinator for IMPRINT viz. IIT, Kanpur is responsible for convening the Apex Committee meetings.

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

Administering of R&D Projects

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

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

Funding Mechanism:

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

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

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

Project Monitoring:

Quarterly Progress Reports and Utilization Certificates are submitted by the project implementing organization to the R&D Management Division of CPRI, Bengaluru. Further, the Four Technical Committees and the SCRD meet from time to time to 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 20 projects under the "R&D under NPP" scheme, 50 projects under RSoP scheme and 35 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 will not only help in development of innovative solutions thereby adding to the knowledge capital on the particular priority area but also acts as prior art for the future researchers.

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 the Technical Committee on Transmission, Grid, Distribution and Energy Conservation, Hydro and Thermal Research and then approved by Standing Committee on R&D (SCRD), for projects above Rs. 50 Lakhs and by Director General, CPRI for projects with outlay upto Rs. 50 Lakhs.

For the year 2018-19, following is the summary of the ongoing In-house Research Projects at CPRI:

Sl. No.	Project Title	Division	Outlay (Rs. in lakhs)	Duration
1.	Smart Inverter with E meter and IOT	Metering & Utility Automation Division, CPRI, Bengaluru	46.80	2 years
2.	A reliable optimal smart metering infrastructure for Smart Grid	Power Systems Division, CPRI, Bengaluru	70.00	2 years
3.	A Novel Optoelectronic Technique for Online Partial Discharge Monitoring of Transformers	Cables & Diagnostics Division, CPRI, Bengaluru	36.00	2 years
4.	Wide Area Measurement System (WAMS) based Fault Signature Analysis for fault detection and location assessment using measurements from Phasor Measurement Units (PMUs)	Power Systems Division, CPRI, Bengaluru	49.35	3 years
5.	Effect of harmonic due to large scale penetration of Rooftop SPV Power Plant	Distribution Systems Division, CPRI, Bengaluru	20.00	2 years
6.	A study on the effect of nanoparticles on the critical parameters of insulating fluids	Dielectric Materials Division, CPRI, Bengaluru	20.00	2 years
7.	Evaluation of the co-firing characteristics of Alternative Fuels mixed with high ash Indian coals for power generation applications	Materials Technology Division, CPRI, Bengaluru	33.00	2 years
8.	Development of LDPE, MDPE and HDPE Nano-composite for DC Cable Application	Cables & Diagnostics Division, CPRI, Bengaluru	105.00	2 years
9.	Study of AC Corona Phenomena and power loss for 1200 kV conductors and characterization of corona discharges from line / substation components	UHV Research Laboratory, CPRI, Hyderabad	132.00	2 years
10.	Study of Electric Field Environment of HVDC Transmission Lines	UHV Research Laboratory, CPRI, Hyderabad	114.00	3 years
11.	A study on online partial discharge measurement of power cables using inductive couplers and noise elimination by wavelet technique	Cables & Diagnostics Division, CPRI, Bengaluru	92.00	3 years
12.	Evaluation of re-ignition circuit by replacing the air gap with vacuum interrupter bottles	High Power Laboratory, CPRI, Bengaluru	105.00	2 years

Sl. No.	Project Title	Division	Outlay (Rs. in lakhs)	Duration
13.	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
14.	Development and Demonstration of an Adaptive Protection Scheme for Distribution Systems under High Penetration of Distributed Energy Resources	Power Systems Division, CPRI, Bengaluru	72.38	2 years
15.	Development of gasification reactor system for conversion of multi fuel to syngas	Materials Technology Division, CPRI, Bengaluru	91.00	2 years
16.	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
17.	Run-of-the-River low head micro hydroelectric system for off-grid microgrid operation	Materials Technology Division, CPRI, Bengaluru	93.50	2 years
18.	Smart Transmission through Wide Area Measurement System to control and co-ordinate HVDC/FACTS devices	Power Systems Division, CPRI, Bengaluru	110.00	2 years
19.	Improvement in Composite Polymeric Insulator Characteristics with Nano Filler Additives for Outdoor DC Applications	Insulation Division, CPRI, Bengaluru	48.47	1.5 years
20.	New Generation Ethylene Vinyl Acetate (EVA) nano-composites with high UV shielding properties for Photovoltaic Modules	Insulation Division, CPRI, Bengaluru	27.50	1.5 years
21.	Development of Polymeric Films for High Energy Density Capacitors Application	Dielectric Materials Division, CPRI, Bengaluru	94.60	1.5 years

For the year 2018-19, following is the summary of the completed in-house research projects at CPRI:

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
1	Assessment of low cycle thermal fatigue damage in steam turbine during transient	Thermal Research Centre, CPRI, Nagpur	50.00	2 years

Sl. No.	Project Title	Division	Outlay (Rs. in Lakhs)	Duration
2	Studies to Establish Critical Resistive Leakage Current of Gapless ZnO Polymeric Surge Arresters for In-service Failure Prediction	High Voltage Division, CPRI, Bengaluru	21.50	2 years
3	Assessment of Pollution level and Design of External Insulation for High Voltage Transmission System	High Voltage Division, CPRI, Bengaluru	11.50	2 years
4	A Laboratory Investigation for Standardization of Testing Method for Pollution Performance of Polymer Insulators	High Voltage Division, CPRI, Bengaluru	20.90	2 years
5	Design and Development of 10 kA 1000 V Synchronized Static switch for Evaluation of Breaking Performance of Miniature Circuit Breaker (MCB)	Short Circuit Laboratory, CPRI, Bengaluru	20.00	1 ½ years
6	Development of flame retardant polymer composites for insulating applications	Dielectric Materials Division, CPRI, Bengaluru	17.00	2 years
7	Dielectric nano-composites for capacitors applications	Dielectric Materials Division, CPRI, Bengaluru	44.50	2 years

Research Scheme on Power (RSoP) Projects

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

For the year 2018-19, the following is the summary of the ongoing RSoP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1	Development and AC Characterization of 2nd Generation High Temperature Superconductor (HTS) based Modular SFCL System	Inter-University Accelerator Centre, New Delhi	49.60	2 years
2	Development of High temperature Low Sag Nano composite Core	SIT, Tumkur	28.00	2 years
3	Development of Control Strategies for Grid Connected PV System utilizing the MPPT and Reactive Power Capability	Indian Institute of Technology, Kanpur	31.25	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
4	Day Ahead Solar Power Forecasting for Indian Climatic Zone	Central Power Research Institute, Bengaluru	50.00	2 years
5	Characterization of Electric Double Layer Super Capacitor with CNT-conducting Polymers / Metal Oxide Composites and Nano Dielectrics	R.V. College of Engineering, Bengaluru	16.00	2 years
6	Hybrid HVDC Systems for Multi Infeed Applications	M.S. Ramaiah Institute of Technology, Bengaluru	17.00	2 years
7	Inferring the dielectric and partial discharge characteristics of nano fluids for power transformer applications	Sona College of Technology, Salem	17.00	2 years
8	Investigation on the operation and control of multiple distributed generation sources in micro grid (Phase-II)	National Institute of Technology, Karnataka (NITK), Surathkal	25.00	2 years
9	Development of intelligent relaying scheme for microgrids with DG penetration	Indian Institute of Technology, Bhubaneswar	28.00	2 years
10	Design, development and deployment of grid interfaced power conversion unit for solar -wind power generation system	Arunai Engineering College, Tiruvannamalai	3.45	2 years
11	Development of solid state transformer as a wind power interfacing device	National Institute of Technology, Calicut	28.00	2 years
12	Characterization and development of silicone rubber-EPDM Nano composites as outdoor insulating material for EHV applications	Indian Institute of Technology, Madras	61.00	2 years
13	Development of a dsPIC based efficient system for simultaneous active power sharing and reactive power compensation in a grid-connected photovoltaic system	Mizoram University, Aizawl	7.10	2 years
14	Studies on Development of Guidelines for Best Practices in Water & Waste Usage in Coal Based Thermal Power Plants	Excellence Enhancement Centre for Indian Power Sector, New Delhi	42.00	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
15	Studies to improve the performance of fault location algorithm for multi-location shunt fault in transmission line-A case study of Chhattisgarh state	National Institute of Technology, Raipur	27.00	2 years
16	Adaptive protection schemes for microgrids with grid - connected and islanded mode of operation	Indian Institute of Technology, Roorkee	30.00	2 years
17	Erosion-Corrosion Studies on Thermal Sprayed Conventional and Nanostructured Coatings	Indian Institute of Technology, Madras	68.00	2 years
18	Performance improvement of steam generator through the penhanced hydrophobic surface	Indian Institute of Technology, Bhubaneswar	49.98	2 years
19	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
20	Experimental and computational analysis of heat sink application for optimal performance by developing low cost natural filler reinforced composite material	NIT, Silchar	49.50	2 years
21	Development of Blue Light Emitting Diode packages	M.S. University of Baroda, Vadodara	49.50	2 years
22	High performance PFC based LED Drivers working under Stringent AC Supply	Government Engineering College, Bikaner	34.76	2 years
23	IEC 61850 Compliant SF6 Monitoring System for Gas Insulated Switchgear	VSSUT, Burla	48.00	2 years
24	Development of Nanocrystalline Materials for Solid Oxide Fuel Cells working at 600 degree C	KITS, Coimbatore	27.46	1.5 years
25	Post Combustion Carbon Capture & Sequestration (CCS) Plant on a Coal Fired Thermal Power Plant – Feasibility Study	RKDF University, Bhopal	38.50	1.5 years
26	Analysis of Performance of Inclined Plate Anchors Embedded in Geosynthetics Reinforced Soils for Transmission Tower Foundations	IISc, Bengaluru	31.96	1.5 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
27	Investigations on Control Flexibilities of Grid Integrated Solar Photo Voltaic Energy Conversion System	NIT, Warangal	31.10	1.5 years
28	Development of High-Power and High-Energy Density Solid-State Hybrid-Energy Storage Device	Pondicherry University, Puducherry	59.24	1.5 years
29	High Capacitance (50F to 200F) Graphene Supercapacitors for Storage of Power from Renewable energy Sources	CMET, Thrissur	71.28	1.5 years
30	Design and Development of RF Sensors for Identification and Localization of Incipient Discharges in GIS	IITM, Chennai	38.40	1.5 years
31	Design and Development of a Cost Effective & Energy-Efficient Grid-Connected Pumped Hydro System employed with Sensor-Less PMBLDCM	NIT, Shillong	32.09	1.5 years
32	Model Order Reduction for Simulation Acceleration in Power Electronics	NIT, Srinagar	7.02	1.5 years
33	Design, Development and Validation of a New Adaptive Digital Relaying Scheme for Power Transformer	IIT, Roorkee	47.73	1.5 years
34	Bio-processing of Coal Industrial Effluent and Coal Fines Recovery using Aquatic Plants and Phototrophs	CIMFR-CSIR, Dhanbad	36.85	1.5 years
35	Design and Development of 5m Long Single Phase HTS Cable	IIT, Kharagpur	51.21	1.5 years
36	Development of Electrolytic Capacitor-Free Power Electronics Driver for LED Lighting with Power Factor Correction for Effective Performance under Grid Voltage Variation	Sagar Institute of Science and Technology, Bhopal	48.00	2 years

For the year 2018-19, the following is the summary of the completed RSoP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1	Dielectric Diagnosis of EHV Bushings using Frequency Domain Spectroscopy (FDS) including cause Identification for Abnormal Conditions of the Bushing	Tamil Nadu Genera tion & Distribution Corporation Ltd. (TANGEDCO), Chennai, Tamil Nadu	40.00	2 years
2	Development of Smart Grid, Controllers for Hybrid Renewable Distributed Generator for a Stand - alone and Grid-connected Operation Addressing Reliability and Power Quality Issues	National Institute of Technology, Puducherry	35.15	2 years
3	Compilation of Data on Latest Technologies in Geological & Geotechnical Investigations and Problems Faced & Mitigation Measures adopted during Execution of Hydroelectric Projects	Central Board of Irrigation and Power, New Delhi	40.00	2 years
4	Use of Synchorphasors in Power System Load Modelling and State Estimation	IIT, Kanpur	43.20	2 years
5	Wide - Area Damping Controller Design for Power Systems	National Institute of Technology, Rourkela	29.83	2 years
6	Hydrogen Fuel Generation by Splitting of Water using Nano-sized Metal Doped Layered Titanates for Fuel Cell Applications	Anna University and University of Madras, Chennai	30.31	2 years
7	Reduction of Switching Transients in Doubly Fed Induction Machines Used in Large Pumped Storage Plant	Indian Institute of Technology, Roorkee	23.75	2 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 (Transmission, Grid, Distribution & Energy Conservation, Hydro and Thermal Research) and approved by Standing Committee on R&D chaired by the Chairperson, CEA, New Delhi.

For the year 2018-19, the following is the summary of the ongoing NPP projects:

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1	Integrated sustainable power generation from short rotation forestry enhanced biomass in rural and semi urban areas within clean development mechanism (CO2 mitigation) - R&D initiative for National biomass action plan	Aligarh Muslim University (AMU), Uttar Pradesh.	65.70	2 years
2	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
3	Development of polymer nano-composites for EHVDC Lines and diagnostics adopting laser induced breakdown spectroscopy (LIBS)	IIT, Madras	268.41	2 years
4	Study of photo biological safety of LED lamps and luminaire	CPRI, Bengaluru	400.00	2 years
5	Investigation on flow instabilities in draft tube at off-design operation of hydraulic turbines	IIT, Roorkee	175.00	2 years
6	Establishing Novel Erosive Wear Test Facility for Testing of Materials Used in Hydroturbine Components	IIT, Madras	125.00	2 years
7	Low cost silicon rubber insulator	Raychem RPG Pvt Ltd., Gujarat	141.90	2 years
8	Power Conversion, Control and Protection Technologies for Micro-Grid	Indian Institute of Science, Bengaluru	336.00	2 years
9	Development of intumescent fire retardant nano-composites for medium voltage cable sheathing applications	The Energy and Resources Institute, Bengaluru	134.00	2 years

For the year 2018-19, the following is the summary of the completed NPP projects

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
1	Development of Nano-structures – transformer oil Nano fluids for improvement of thermal and insulating properties.	Bengal Engineering & Science University, Shibpur	80.16	2 years

Sl. No.	Project Title	Organization	Outlay (Rs. in Lakhs)	Duration
2	Investigations on New Nano –composite materials for Electrical Insulation	IIT, Ropar	65.00	2 years

Ongoing UAY Projects under National Perspective Plan (NPP) Schemes

Sl. No.	Title of Project	Organization	Total Sanctioned Cost (Rs. in Lakhs)
1	Development of a high efficiency, high pressure ratio 'Micro Steam Power Pump Block' of 100 kW capacity	IISc, Bengaluru	208.00

Ongoing IMPRINT Projects under National Perspective Plan (NPP) Schemes

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

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.	Conducting Polymer based electrode material for supercapacitor	DST-SERB (Department of Science & Technology-Science and Engineering Research board)	May 2017 to May 2020 3 years	23,06,000/-
2.	A Management service for the treatment of transformer mineral oil containing PCBs using the mobile PCB dechlorination system in India	United Nations Industrial Development Organization (UNIDO), Vienna, Austria	2016-2019 3 years	4.80 crores

Energy Efficiency & Renewable Energy Division

Sl. No.	Title	Sponsoring Organization	Duration (Start & Close)	Outlay
1.	Establishment of LED luminary test facility across various locations of India	BEE	Jan 2018 to Dec 2020	Rs.16.20 Crores
2.	Establishment of new facility for check testing of Induction Motors	BEE	April 2012 to Mar. 2020	Rs. 273.00 lakhs
3.	Capacity addition for check testing of LED	BEE	April 2012 to Mar. 2020	Rs. 354.00 lakhs
4.	Establishment of new facility for check testing of UPS	BEE	April 2012 to Mar. 2020	Rs.60.00 lakhs
5.	Capacity addition for check testing of Tubular Fluorescent lamps	BEE	April 2012 to Mar. 2019	Rs. 65.00 lakhs

Earthquake Engineering & Vibration Research Centre

Sl. No.	Title	Sponsoring Organisation	Duration (Start & Close)	Outlay (Rs. in lakhs)
1.	Seismic Performance Evaluation of Corroded RCC Frames by Shake Table Tests	BARC	Dec.2015 to June 2019	Rs.36.00 Lakhs

Information on Patents

The following are the innovative patents filed by CPRI during the financial year 2018-19.

The patents details are listed below: -

Sl. No.	Title of the Patent	Patent Application No.	Date of Filing	Inventors Names
1.	"Die electric mineral oil based nano fluids for transformers".	201841034834	15th September 2018	Dr. P. Thomas, Additional Director CPRI, Bengaluru & Smt. Nandini.E.Hudedmani, Project Associate, DMD, CPRI, Bengaluru.
2.	"Synthetic ester based nano fluids for transformer insulation"	Yet to obtain	15th September 2018	Dr. P. Thomas, Additional Director CPRI, Bengaluru & Smt.Nandini.E.Hudedmani, Project Associate, DMD CPRI, Bengaluru

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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 2018-19, a total of 83743 evaluations were conducted on 25920 samples for 5239 organizations which includes Central, State & Private Power Utilities, domestic and international electrical equipment manufacturers.

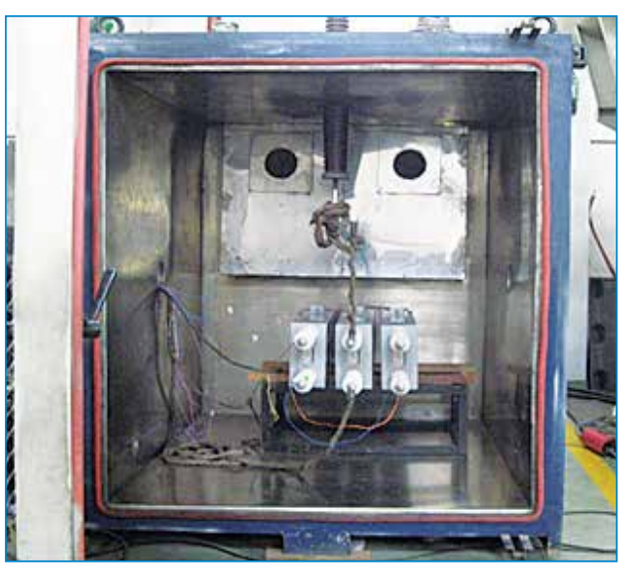
First –time Tests

Capacitors Division

- **HV Shunt Capacitors**

Testing and evaluation of HV Shunt capacitors of various ratings ranging from 100kvar,6.84kV to 1000kvar,22kV from various organizations as per national and international standards and industry protocols in shortest possible time schedule.

Testing and evaluation of HT Shunt capacitor of rating 1100kvar,7.3kV, 68 µF as per IEC 60871-1-2014 which was the highest rating of shunt capacitor manufactured in India and tested for the First time in the division. Testing and evaluation of 1000kvar,22kV Fuseless HT Shunt capacitor was the highest voltage rating tested as per IEC 60871-1-2014, for the first time in capacitors division.



Arrangement for Thermal Stability Test on 1100kvar 7.3kV, 68 µF, Int. Fuse capacitor unit

Test arrangement for Lightning Impulse voltage test 1000kvar, 22kV, 6.9µF Fuseless HT Capacitor unit

- **H V Series Capacitors**

Testing and evaluation of HV Series capacitors of rating 778.41kvar, 12.56kV, 50Hz, 1 Phase Fuseless Series capacitor unit manufactured in India, as per IEC 60143-1-2015 , for the first time in capacitors division.

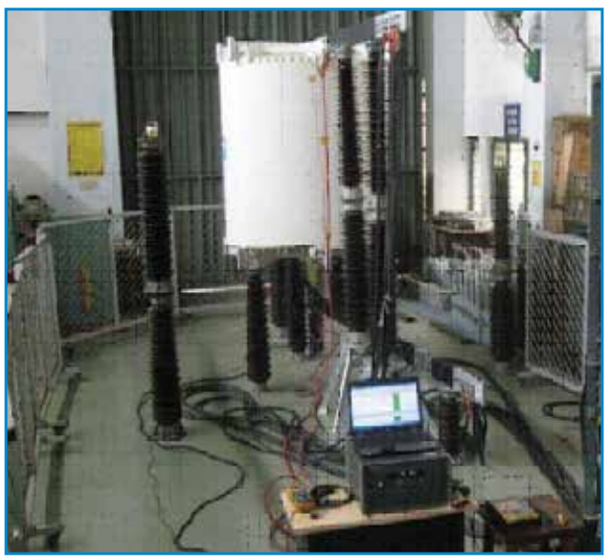
Arrangement for Thermal Stability Test on 778.41kvar, 12.56kV, 50Hz, 1 Phase Fuseless Series capacitor

Arrangement for Discharge Current Test on 778.41kvar, 12.56kV, 50Hz, 1 Phase Fuseless Series capacitor

- **Line Traps and Reactors**

Line trap of 1.0mH, 2000 A rating used in EHV substation was tested for temperature rise test as per IEC 60353-1989: Amd:1 2002 using the available resources in the capacitor division. This is the largest rating of Line trap ever tested in CPRI and is also the first time tested in a third party independent lab in the country. Photographs of the Line trap undergoing temperature rise test as per the rating mentioned above and Line traps of other ratings are shown below:

Damping & detuned reactors used in HV and LV systems in series with capacitor banks were also tested in the capacitors division.



1.0mH, 2000A, Line trap undergoing temperature rise test

0.2 mH, 1250A, Line trap undergoing temperature rise test

Electrical Appliances Technology Division

- Battery Testing Laboratory has been accredited for the first time by BIS High Power Laboratory

High Power Laboratory

- Electrical endurance test for E2 class carried out successfully first time as per IEC 62271-100 on 36 kV, 1600 A, 26.3 kA, Outdoor PCVCB for M/s. Stelmec Ltd., Virar Maharashtra, at High Power Lab, CPRI, Bengaluru, on 1st November 2018, 12th & 13th December, 2018.

Electrical endurance test on 36 kV, 1600 A, 26.3 kA, Outdoor PCVCB

High Voltage Division

- Dielectric and RIV tests were carried out as per IEC 62271-203 on 245 kV SF6 Gas insulated switchgear and 400kV SF6 Gas insulated switchgear comprising of Circuit Breaker and Disconnecting switches from 11th to 26th June 2018 for the first time in the country.

Dielectric and RIV tests were carried out as per IEC 62271-203 on 245 kV SF6 Gas insulated switchgear and 400kV SF6 Gas insulated switchgear

Insulation & Heat Run Test Laboratory

- Temperature rise test on 245kV and 420kV GIS Equipment of M/s. Hyosung T&D India Pvt., Ltd., Pune manufactured in Pune, assembly and witnessing of testing was conducted by the engineers of both the branches (Pune and South Korea)

Temperature rise test on 245kV and 420kV GIS

- Vertical drop Impact tester for cable cleats and clamps both single and trefoil. Mechanical impacts are likely to stress electro technical equipment's in service. One of the way in which this stress can be reproduced in the lab. is by using hammer tests of various severities. With this in view, the Division has fabricated a Vertical Drop Impact Tester employing vertical hammer for stress testing. The instrument is capable of simulating an energy of 2J, 5J, 10J, 20J and 50J. Other energy levels as required can also be simulated by changing the drop weight. This instrument complies to IEC 60068-2-75, IEC 61914, BS EN 50483, NFC 33-020 etc. and can be used for stress testing of cable cleats/clamps, enclosures, connectors etc. to name a few. The test was conducted for the first time for M/s. PTE (Power Transmission and Telecommunication Equipment) Factory Co., Jeddah on 400kV, 2500sq.mm cable cleats in the month of July 2018.

Stress testing on 400kV, 2500sq.mm cable cleats for M/s. PTE (Power Transmission and Telecommunication Equipment) Factory Co., Jeddah

Metering & Utility Automation Division (MUAD)

- IEC 61850 Edition 2 conformance testing for the first time in India for M/s. BHEL, Hyderabad. The test certificate issued by CPRI is approved by UCA International Users Group, USA.
- Type Testing of 3 Phase Smart Energy Meter Transformer operated as per IS: 16444 (Part 2):2017 of M/s. Landis Gyr, Kolkatta & M/s. Genus Power Infrastructures Ltd., Haridwar.

Mechanical Engineering Division (MED)

- Successfully conducted a series of test first time on IR Type Full scale Cantilever Assembly test as per customer requirement for M/s. Larsen & Toubro -Inabensa, Allahabad & Jaipur.

Power Systems Division (PSD)

CPRI, Bengaluru has established the country's first PMU Testing laboratory. The evaluation of PMUs both Steady state and Dynamic testing was carried out using the 6135A PMU calibrator of Fluke make, for the first time on ABB make PMU RES670 - a standalone PMU. The standards followed are IEEE C37.118:2011 and IEEE C37.118.1a:2014. The following steady state compliance and Dynamic compliance tests were carried out on the RES670 PMU of ABB:

- **Steady state compliance tests:** Signal Frequency Range, Signal Magnitude – Voltage, Signal Magnitude – Current, Harmonic Distortion, Out of Band Interference (Interharmonics)
- **Dynamic compliance tests:** Dynamic compliance—Measurement bandwidth: Phase & Amplitude Modulation, Dynamic compliance—Performance during ramp of system frequency, Dynamic compliance—Performance under step changes in phase and magnitude, PMU Reporting latency

Dynamic compliance tests

Short Circuit Laboratory

- Following tests were conducted on 240V, 5-30A single Phase two wire UC2 Prepaid energy Meter for the first time as per Annexure G-5 & G-6 of IS15884:2010 (Reaffirmed 2016) for M/s. Larsen & Toubro Ltd., Mysore

a) Fault Current making Capacity

b) Short Circuit Current Carrying Capacity

c) Minimum Switched Current as part of post-test-for above 2 tests

Testing of 240V, 5-30A single Phase two wire UC2 Prepaid energy Meter

Thermal Research Centre, Koradi

- Root cause analysis of IPCV Bolt failure of Unit No.2 (660MW) of M/s. Prayagraj Power Generation Co., Ltd, Distt. Allahabad, held from January to March 2019.

Ultra High Voltage Research Laboratory, CPRI, Hyderabad

- Dielectric test on truck mounted insulating boom was performed at UHVRL, CPRI, Hyderabad for M/s. MT and T Ltd., Chennai, for the first time in India, on 14th March 2019.

Dielectric test on truck mounted insulating boom

New Test Facilities Created

Dielectric Materials Division

- **Bio degradability test** on natural esters as per OECD 301 B.

  The division is having test facilities for carrying out tests on natural esters as per IEC 62770 / IS : 16659.

- **Automatic Colorimeter** for unused synthetic organic esters as per ISO 2211 The division is having test facilities for carrying out tests on unused synthetic organic esters as per IEC 61099 / IS : 16081. Dynamic Mechanical Analyser measures glass transition temperatures and secondary transitions, orientation caused by processing, cold crystallization, cure optimization, filler effects in composites, material stiffness (modulus), mechanical properties such as damping, creep, and stress relaxation of materials as a function of time at various temperature from -150 to 6000C and at different frequencies from 0.01 to 200 Hz as per ASTM D 7028.

- **Simultaneous DSC- TGA (SDT)** measures both the heat flows (DSC) and weight changes (TGA) associated with transitions in a material as a function of temperature and time in a controlled atmosphere from ambient to 1500 0C.

- **Dielectric Impedance Analyser/Alpha – A high performance Frequency Analyser** measures impedance at various frequencies from 100 Hz to 1 MHz and at different temperatures from ambient to 3000C.

Electrical Appliances Technology Division

- New test facilities such as endurance, water loss, Sulphation, oxygen recombination, and capacity test at low temperature (-18o C) has been added in Battery Testing Laboratory of Electrical Appliances Technology Division, CPRI, Bengaluru.

- Twenty four new standards have been added in scope of battery testing which include Indian, Japanese, IEC and RDSO in Battery Testing Laboratory of Electrical Appliances Technology Division, CPRI, Bengaluru.

- The Climatic Chamber at Battery Testing Laboratory was reconditioned and is in use for testing of batteries up to 2000 Ah. The batteries can be tested at low and high temperatures (-30 to 40oC) as per various National and International standards.

Metering & Utility Automation Division (MUAD)

- Extended conformance test facility for carrying out IEC 61850 Edition 2 testing of Intelligent Electronic Devices at MUAD. The facility is accredited by UCA International Users Group, USA, during September 2018 and the facility is available only at CPRI in India.

Short Circuit Laboratory

Following test facilities have been created at Short Circuit lab, CPRI, Bengaluru on Smart Meters as per IS 16444 : 2015 & IS 15884 : 2010:

Load Switching Capability

i) G-5 Fault Current Making Capacity
i i) G-6 Short-Circuit Current Carrying Capacity
i i i) G-7 Minimum Switched Current

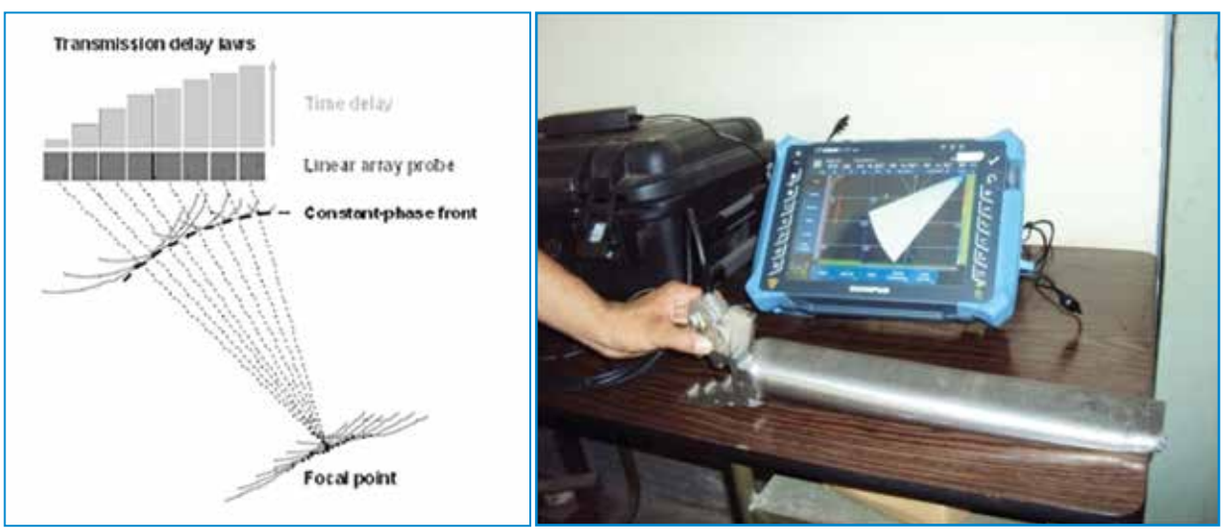
Switchgear Testing & Development Station (STDS), Bhopal

- Computer aided feeder loading unit has been installed with feeder unit ranging from 50A to 2000A to meet the testing of Feeder Pillars in Temperature Rise Test Lab., STDS-CPRI, Bhopal.

Thermal Research Centre (TRC), Koradi

- Ultrasonic Phased Array Inspection System has been established.

Phased array ultrasonics (PA) an advanced method of ultrasonic testing that has applications in medical imaging and industrial non destructive testing. To noninvasively examine the heart or to find flaws in manufactured materials such as welds.



Ultrasonic Phased Array Equipment at TRC-CPRI, Nagpur

- Micro Hardness Test Facility has been established to measure Vickers and Knoop Hardness as materials as per standards ASTM E 92 and ASTM E 384

Micro Hardness Test Facility at TRC-CPRI, Nagpur

Ultra High Voltage Research Laboratory, CPRI, Hyderabad

- Partial Discharge test on 420 kV OIP condenser bushing of M/s. BHEL, Bhopal was successfully carried out at UHVRL-CPRI, Hyderabad, from 25th to 27th February 2019

Partial Discharge test on 420 kV OIP condenser bushing

- Partial Discharge test successfully conducted in 1200 kV. Indoor Laboratory, UHVRL-CPRI, Hyderabad on 145 kV. live tank Current Transformer (CT) of M/s. Toshiba Transmission & Distribution Systems (India) Private Limited, Rudraram, Patancheru, Sangareddy District, on 25th September 2018

Partial Discharge test conducted on 145 kV. live tank Current Transformer

- DC Pollution Test by Solid –Layer method on + 500 kV HVDC Composite Insulator String for M/s. BHEL, Bengaluru, conducted on 11th & 12th January 2019

DC Pollution Test by Solid –Layer method on ± 500 kV HVDC Composite Insulator String

Special Tests Conducted
Capacitors Division

Low Voltage Capacitors

- The rating of LV shunt capacitors are from 25 kvar to 100 kvar. A view of some of the LV shunt capacitors samples tested is shown below:

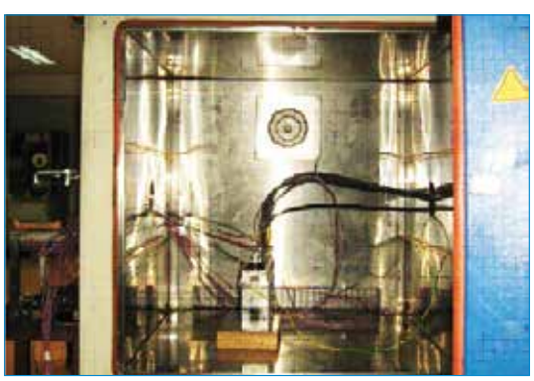
Some of the LV shunt capacitors tested

- AC motor capacitors were in the range from 1.5 µF to 72 µF. A view of some of the LV shunt capacitors samples tested is shown below :

Some of the AC Motor capacitors tested

Power Electronic Capacitors

- Thermal stability test of power electronic capacitors of rating 3 x 500µF, 252 V was conducted at the capacitors division for an European customer as per IEC 61071-2014 and customer's requirements. A view of the capacitor tested is shown below :



Power electronic capacitor from Spain tested for thermal stability test

Low Voltage APFC Panels

- Testing of Low Voltage APFC panels of different ranges from 100 kvar to 375 kvar were type tested as per the latest Indian standard IS 16636:2017 and as per IEC 61921:2014. Apart from temperature rise test & di-electric tests, the latest Indian standard specifies many new tests such as voltage withstand test between phases, Verification of effectiveness of automatic PF correction feature, Measurement of transient over-currents due to capacitor switching which are not covered in IEC/ IEEE standard. Capacitor division has performed the new tests as per the latest Indian standard IS 16636:2017. A view of some of the APFC panel tested in the Capacitor division is shown below:

A view of 3Φ, 250kvar, 440 V, LV APFC panel undergoing tests

A view of the 3Φ, 100 kvar, 400 V, LV APFC panel undergoing tests

Environmental Tests

- Environmental testing of Outdoor cabinets used in telecom application were carried out as per specific customer's requirements. A view of the tested panel is shown below:

A view of environmental testing of outdoor cabinet undergoing tests

- Environmental testing Dry and damp heat test on D-EHC were carried out in the capacitors division. A view of the D-EHC panel tested is shown below:

A view of the D-EHC panel undergoing tests

Cables & Diagnostics Division

Type test on six Halogen Free Flame Retardant (HFFR) control cables of various cross sections have been successfully carried out for L&T Constructions in connection with Kolkata Metro Rail Project under the joint inspection of L&T, Dedicated Freight Corridor Corporation of India Limited, Jaipur, NK Consortium & Bureau Veritas India Limited.

Earthquake Engineering & Vibration Research Centre

- **Seismic qualification test of substation equipment on:**

  a. Smart Uninterrupted Power Supply 20 KVA for M/s. Schneider Electric IT Business Pvt. Ltd., Rosario Cavite – 4106, Philippines.

Seismic qualification test on Smart Uninterrupted Power Supply 20 KVA

b. Seismic qualification tests on Sandwich busway system for M/s. Federal Transformers Co. L.L.C., Branch-1, Abu Dhabi, U.A.E

Seismic Qualification test on Sandwich busway system

c. Sandwich busway system for M/s. RR Busduct Power Distribution Equipment Manufacturing LLC, Dubai, U.A.E

d. 420 kV SF6 Circuit Breaker for M/s. ABB India Limited., Vadodara

e. 200 kVA Diesel Generating Set for M/s. Kirloskar Oil Engines Limited, Nasik

f. 420 kV, 800A Oil Impregnated Paper Condenser Bushing for M/s.GE T&D India Ltd., Hosur

g. 220 kV three pole solid core two stack insulator for M/s. Aditya Birla Insulators, Tal. Halol, Dist. Panchmahal

h. 145 kV, 3 pole, SF6 Circuit Breaker for M/s. GE T&D India Limited, Salamangalam Village, Padappai

Vibration and Shock testing of Railways applications-Rolling stock equipment:

a. Electrical panel Drive cabinet for M/s Danfoss Industries Pvt. Ltd., Sriperumbudur Taluk, Tamilnadu

b. Vehicle control unit for M/s. Bharat Heavy Electricals Limited, Bengaluru

c. 15 kVA, 415/140V Three Phase Transformer for M/s. Salzer Electronics Limited, Coimbatore

d. Relays, circuit breakers, energy meters, communication equipment, control panel, relay panel, switchgears etc.,

Mechanical Engineering Division

- Successfully conducted type tests, stress-strain test, ultimate tensile tests etc. on various conductors of international customers for M/s. Ducab Cable Company, Dubai.

Short Circuit Laboratory

- Short-circuit test at 6.25kA rms. for 1.0 second was carried out on Discharge Earthing Rod assembly consisting of fibre glass rod, top clamp, cable & bottom rail clamp for 25kV AC traction as per RDSO specification, on 27th August 2018.

Short-circuit test at 6.25kA rms. for 1.0 second on Discharge Earthing Rod assembly

- Short-time current test at 5.0kA rms for 10 seconds (symmetrical) was carried out on 17.2 mm dia 700 mm Long Copper Bonded MS Rod with exothermically welded copper flat of 200x25x6 mm as per RDSO specification, on 22nd June 2018.

Short-time current test at 5.0kA rms for 10 seconds (symmetrical) was carried out on 17.2 mm dia 700 mm Long Copper Bonded MS Rod

Switchgear Testing & Development Station (STDS), Bhopal

- Short circuit Dynamic Withstand test was conducted on 12500kVA, 33/4X0.6kV, Transformer for M/s Electrotherm (India) Ltd., Ahmadabad, on 23rd July 2018.
- Short circuit Dynamic Withstand test was conducted on 30000/50000 kVA, 132/33 kV, 3-Phase Power Transformer for M/s. CG Power and Industrial Solutions Limited., Mandideep, on 14th September 2018.
- Short time withstand current and peak withstand current test was conducted on 24kV,6300A, 90kA, Off- load Disconnector, for M/s. C & S Electric Ltd., Greater Noida, on 17th October 2018.
- Short time current test was conducted on 36kV, 22500Amp, 160kArms. Isolated Phase Busduct for M/s. Bharat Heavy Electricals Ltd., Rudrapur, on 26th November 2018.
- Short circuit dynamic withstand test was conducted on 2880kVA, 22.5 / (4 x 0.855) kV Single Phase EMU Transformer, for M/s. Medha Servo Drives Pvt. Ltd., Hyderabad, on 3rd December,2018 Make : M/s JST Transformateurs, 84, Avenue Paul Suity – 69009 LYON, France.
- Short time withstands current & peak withstand current test was conducted on 145kV, 2500A, Single Pole, Pantograph Disconnector with Regid conductors Switch (MGB), for M/s. S & S Power Switchgear Equipment Ltd., Puducherry, on 4th January, 2019.

Overseas Third party inspection service as STL Member:

High Power Laboratory

- Third Party Witnessing of tests on 1 No., 45MVA, 132kV/33kV Transformer at Malaysia for M/s. Malaysia Transformer Manufacturing Sdn. Bhd, Malaysia, from 2nd April 2018 to 15th April 2018. Shri Sreeram.V, Engg Officer Gr.3, High Power Lab, CPRI, Bengaluru was deputed for witnessing the test at Malaysia.
- Third Party Witnessing of tests on 1 No.,90 MVA, 132kV/33kV Transformer at Malaysia for M/s. Malaysia Transformer Manufacturing Sdn. Bhd, Malaysia from 12th to 25th September 2018. Shri Govinda Rao.G, Engg. Officer Gr.3 from High Power Lab, CPRI, Bengaluru was deputed for witnessing the test at Malaysia.
- Post Short Circuit Inspection of 120 MVA Transformer at M/s.Energypac Engg. Ltd., Dhaka, Bangladesh from 28th October 2018 to 7th November 2018 carried out by Shri Maroti, Engg. Officer Gr.4, CPRI, Bengaluru
- Third Party witnessing of tests on 90MVA, 132/33kV three phase Transformer (2 nos.) at Malaysia Transformer Manufacturing SDN BHD, Kaulalumpur, from 15th November to 2nd December 2018 by Mr. Govinda Rao, Engg. Officer Gr.3, High Power Laboratory, CPRI, Bengaluru
- Third Party witnessing of tests on 90MVA, 132/33kV three phase Transformer at Malaysia Transformer Manufacturing SDN BHD, Kaulalumpur, from 21st to 25th January 2019, by Mr. Rajaramamohanarao Chennu, Engg. Officer Gr.3, High Power Laboratory, CPRI, Bengaluru.

- Third Party witnessing of tests on 90MVA, 132/33kV three phase Transformer at Malaysia Transformer Manufacturing SDN BHD, Kaulalumpur, from 28th March to 3rd April 2019 by Mr. Arunkumar, Engg. Officer Gr.3, High Power Laboratory, CPRI, Bengaluru.

Testing & Certification for Overseas Customers

Cables & Diagnostics Division

- Type tests on LV &HV Cables as per IEC 60502-1 & IEC 60502-2 for M/s. Riyadh Cables Group, Riyadh, Dubai Cable Company Limited
- Type tests on LV Cables as per IEC 60502-1 for M/s. Partex Cables Limited, Bangladesh, M/s. Qatar International Cable Co. Qatar, QICC-A Nexans Company, Qatar, & Elco Wires & Cables Limited, Bangladesh
- Type tests on HV Cables as per IEC 60502-2 for M/s. Jiandsu Zhonghan Technology Co. Ltd., ZTT, China, & BRB Cable Industries, Bangladesh
- Type tests on 33 kV Cable accessories as per IEC 60502-4 and Type tests on 132 kV Cable accessories as per IEC 60840 for M/s. 3M Asia Pacific (S) Pte. Ltd., Singapore
- Type tests on covered conductors as per EN 50393-7 for M/s. Phelps Dodge International (Thailand) Limited, Thailand
- Partial Discharge tests on Current Transformers as per IEEE C 57.73-2016 for M/s. Energypac Engineering Limited, Bangladesh
- Fire retardant Low smoke Tests on LV Cable as per IEC 61034 for M/s. Fujikura federal Cables Sdn. Bhd, Malaysia and as per IS 694 for M/s. Kelani Cables, Srilanka
- Circuit Integrity tests on LV Cable as per IEC 600331 for M/s. Supersign Industries (Elec.) Limited, Bangladesh & SQ Wire & Cable Co. Limited, Bangladesh
- Four Cables of 0.6/1 kV, 6.35/11 kV & 19/33 kV rating have been tested for M/s. Doha Cables, Qatar for its compliance to the Fire Retardant and Low Smoke Properties.
- Testing of 100kvar, 12.7kV single phase HT Capacitor for M/s. Precise Electric Manufacturing Co. Ltd., Thailand
- Thermal stability testing of 3 phase AC Filter Capacitors for M/s. Epcos Electronic Components SAU, Spain

Energy Efficiency & Renewable Energy Division

- Anti-islanding of solar grid tied inverter of 27.6 kW capacity was tested for M/s. Solar Edge Technologies Ltd., Israel
- Testing of Inverter for M/s. Hoymiles Power Electronics Technology Co. Ltd., China

High Power Laboratory

- Ability to withstand the dynamic effects of short circuit test on 315 kVA, 33/0.433 kV, Three phase transformer for M/s. OMAN Industry Transformers & Switchgear, Sultanate of OMAN, on 22nd May 2018 & on 5th June 2018.

- Ability to withstand the dynamic effects of short circuit test on 80/120MVA,132/33kV. Three phase transformer for M/s Energy pac Engineering Ltd., Bangladesh, on 8th June 2018.
- Internal Arc test on 24kV,25kA 800A Air insulated switchgear for M/s P.T. Siemens Indonesia, Pulomas, Jakarta on 10th July 2018.
- Ability to withstand the dynamic effects of short circuit on 100 MVA, 220/55/55 kV Scott transformer, for M/s. Meidensha Corporation, Japan, on 27th August 2018.
- Short-Time Current Test on 36 kV, Out door dry type current transformer for M/s. PT ESITAS PACIFIC, Jababeka, Indonesia, on 24th August 2018.
- Internal arc test on 24kV AIS Panel Cable Chamber for M/s. PT Siemens, Indonesia, on 25th September 2018.
- Ability to withstand the dynamic effects of short circuit test on 1 MVA, 11/0.4 kV, Three-phase Transformer for M/s. Eurogulf Transformer FZE, Sharjah – United Arab Emirates, on 30th October 2018 & 2nd November 2018.
- Ability to withstand the dynamic effects of short circuit on 60/84/100 MVA, 220/55/55 kV Scott connected traction transformer for M/s. Meidensha Corporation, Japan, on 21st January 2019.

High Voltage Division

- Lightning impulse withstand test on Distribution transformer for M/s Integral Electric Co, Chittogong, Bangladesh, on 24th April 2018 and on 1st & 2nd August 2018
- Lightning impulse withstand test on Distribution transformer for M/s. Automation Engineering, Chittogong, Bangladesh, on 7th May 2018
- Lightning impulse withstand test on Distribution transformer on 8th May 2018 and Long duration current Impulse test
- Operating duty test on Surge Arrester for M/s. Precise Electrical Manufacturing Co. Ltd., Thailand, on 13th June 2018 & on 8th August 2018
- Lightning impulse withstand test on Distribution transformer for M/s Oman Industry Transformer & Switchgear LLC., Sultanate of Oman, on 15th & 25th May 2018
- Lightning impulse withstand test on Distribution transformer on 18th June 2018 & Current transformer on 19th & 20th June 2018 for M/s Energypac Engineering Ltd., Dhaka, Bangladesh,
- Lightning impulse withstand test on Distribution transformer for M/s Powermann Bangladesh Ltd., Dhaka, Bangladesh, on 18th June 2018
- Lightning impulse withstand test on Distribution transformer for M/s. Protec Electronics Ltd., Dhaka, Bangladesh, on 20th June 2018
- Long duration Current Impulse withstand test on Surge Arresters, for M/s Precise Electric Manufacturing Co. Ltd., Thailand, on 6th & 7th June 2018

- High Current Short Duration Test on Elbow distribution Normal Duty Arrester for M/s Arrester Work Boyaton Beach, USA, on 9th & 12th October 2018
- Lightning impulse withstand test on Distribution transformer for M/s. ACME Electronics Ltd., Dhaka, Bangladesh, on 10th July 2018
- Lightning impulse withstand test conducted on 24th July 2018 and Power frequency voltage withstand test on Off circuit tap changer conducted on 14th & 24th August 2018 for M/s Voltamp Transformer, Oman SAOC.
- Lightning impulse withstand test on Distribution transformer for M/s Navana Electronics Ltd., Dhakha, Bangladesh, conducted on 6th August 2018
- Lightning impulse withstand test on Current Transformer for M/s ESITAS Instrument Transformers, Indonesia, on 20th August 2018
- Power frequency withstand voltage test wet for Post Insulators for M/s CTC Power Equipments Co. Ltd., China, on 24th September 2018
- Lightning impulse withstand test on Distribution transformer for M/s LTL Transformers (P) Ltd., Sri Lanka, on 9th October 2018
- Lightning impulse withstand test on Distribution transformer for M/s. Eurogulf Transformers, FZE, Shanjah UAE, on 31st October 2018
- Lightning impulse withstand test on Distribution transformer for M/s Sylvan Technologies Ltd., Dhaka, Bangladesh, on 13th, , 17th & 22nd November 2018
- Lightning impulse withstand test on Distribution transformer for M/s. Electropac Engineering Ltd., Dhaka, Bangladesh, on 18th February 2019

Insulation & Heat Run Test Laboratory

- Temperature rise test on 400V,2500A, ACB Panel for M/s. Ameeri Industries, Kingdom of Bahrain
- Temperature rise test on 200A, Metering Cabinet for M/s. Al-Hamad Industries International, FZE UAE
- Temperature rise test on 500A, Feeder Pillar for M/s. Al-Hamad Industries International FZE UAE
- Temperature rise test on 63A 12kV Tap Changer for M/s. Voltamp Transformer, Oman
- Temperature rise test on 200-400/1-1 A Current Transformer for M/s. PT Esitas Instruments, Indonesia
- Vertical drop impact test on Single & Trefoil Cable Clamp for M/s. Power Transmission and Telecommunication Equipment Factory Co., Jeddah (PTE), Jeddah,
- UV test on Oil Temp. Indicator for M/s. Voltamp Transformer, Oman

Materials Technology Division (MTD)

- Electrical Steel Test Facilities for evaluation of their samples, CRGO – Cold Rolled Grain Oriented for magnetic, electrical, and mechanical properties for M/s. Stalprodukt.S.A. Bochnia, POLAND.

Switchgear Testing & Development Station (STDS), Bhopal

- Breaking capacity test on 415V, 80kA, LT HRC Fuse & 415V, 80kA. HRC Bolted Type Fuse of M/s Lawson Fuses Ltd., Unites Kingdom, for ASTA certification, carried out on 23rd & 24th August, 2018.

TESTING & CERTIFICATION UNDER UL (Underwriters Laboratories):-

- Conditional short circuit test at 18kA rms, 21.6kA rms, 30kA rms & 36kA rms on 250A 415V 3 Pole LV SMDB as per IEC 61439-1 & 2 for M/s. Gama Engineering, Sharjah, UAE, on 17th & 18th July 2018.
- Conditional short circuit test at 15kA rms, 21kA rms, 25kA rms & 35kA rms on 250A 415V 3 Pole & 630A 415V 3 Pole LV SMDB as per IEC 61439-1 & IEC 61439-2 for M/s. Abu Dhabi Power & Control System Works, Abu Dhabi, UAE, from 3rd to 5th September 2018 .
- Short time withstand current at 15.24kA rms for 1 s and contact resistance measurement tests on 271A 600V Terminal Blocks as per IEC 60947-7-1 for M/s. Osada Co. Ltd., Tokyo, Japan, on 7th March 2019.
- Short time withstand current at 7.2kA rms for 1 s & 12kA rms for 1 s and Contact resistance measurement tests on 200A 600V Terminal Blocks as per EN 60947-7-1 for M/s. Hirose Electric Co. Ltd., Japan, on 27th March 2019.
- Short Time Withstand Strength Test was conducted on 639V, 4000A, 100kA, Sandwich Busway of M/s. Underwriters Laboratories (UL) Middle East, Dubai, UAE. Mr. Ashutosh Patil, Sr. Project Engr., UL – Dubai witnessed the test, on 17th January 2019
- Short Time Withstand Strength Test was conducted on 1000V, 5000A, 120kA and 1000V, 2250A, 80kA Sandwich Busway of M/s. Underwriters Laboratories (UL), Middle East, Dubai, UAE. Mr. Ashutosh Patil, Sr. Project Engr., UL - Dubai, witnessed the test, on 21st & 22nd February 2019

TESTING & CERTIFICATION UNDER INTERTEK-ASTA:

- Testing of 12kV, 630A, 3 pole, SF6 gas, 50Hz, Vacuum Circuit Breaker Ring main unit for M/s. Lucy Electric India Pvt. Ltd., Nashik
- Testing of 145kV GIS bus disconnector and earth switch operating mechanism assembly, Testing of 145kV GIS circuit breaker operating mechanism assembly, Testing of 145kV GIS line disconnector and earth switch operating mechanism assembly & Testing of 145kV GIS line high speed earth switch operating mechanism assembly for M/s. Toshiba Transmission and Distribution System (India) Pvt. Ltd., Telangana
- Testing of 175kVAR, 440V. & 375kVAR, 440V. APFC panel for M/s. Larsen & Toubro Electrical & Automation, Powai Campus, Mumbai

- Testing of 250A, 440V 54 way DBO & 100A, 440V 48 way DBO for M/s. Schneider Electric India Pvt. Ltd. , Bengaluru
- Testing of HRC fuse 415V. 10A. Fuse system 'E', Testing of HRC fuse 415V. 20A to 400A Fuse system 'I' (Homogeneous series), Testing of HRC fuse 415V. 400A Fuse system 'I' (Homogeneous series) & HRC fuse 415V. 16A. Fuse system 'C' for M/s. Lawson fuses Ltd., UK
- Testing of 240V. 10A-25A. (Homogeneous Series) (Intermediate Rating 16A & 20A), Testing of Cartridge Fuse, Fuse System-C (BS Cylindrical Fuse System), Testing of 240V. 6A. Cartridge Fuse, Testing of Fuse System-C (BS Cylindrical Fuse System), Testing of 240V, 2A-6A, (Homogeneous Series) (Intermediate Rating 4A) Bolted Fuses, Testing of Fuse System-'E' (BS Bolted Fuse System), Testing of 240V, 10A-32A, (Homogeneous Series) (Intermediate Rating 16A, 20A & 25A), Testing of Bolted Fuses, Fuse System-'E' (BS Bolted Fuse System), Testing of 240V, 30A, Cartridge Fuse, Fuse System-C (BS Cylindrical Fuse System), Testing of 415V, 2-6A, (Homogeneous Series) (Intermediate Rating 4A) Cartridge Fuse, Testing of Fuse System-'C' (BS Cylindrical Fuse System) & Testing of 415V, 8-32A, (Homogeneous Series) (Intermediate Rating 10A, 16A, 20A) & Testing of 25A. Cartridge Fuse, Fuse System-'C' (BS Cylindrical Fuse System) for M/s. Mersen Fuses, Bengaluru

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 2018-19 are provided in Appendix-9.**

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SECTION-4

CONSULTANCY ACTIVITIES

CONSULTANCY ACTIVITIES

Capacitors Division

- On- line PD test by acoustic emission technique was carried out on Generator Transformer-1 No. Startup transformer-1No., Station Transformer-1No., as a part of consultancy work of Diagnostic and Condition Monitoring of Power station equipment during 21st to 23rd December 2018 at site of M/s. NPCIL, TAPS 1&2, Tarapur, Maharashtra.
- On- line PD test by acoustic emission technique was carried out on Generator Transformer-1 No. as a part of consultancy work of Diagnostic and Condition Monitoring of Power Station equipment on 18th & 19th January 2019 at site of M/s THDC Limited- TEHRI HEP, Tehri, Uttarakhand
- On- line PD test by acoustic emission technique was carried out on Generator Transformers - 2Nos. as a part of consultancy work of Diagnostic and Condition Monitoring of Power Station equipment on 20th & 21st January 2019, at site of M/s. THDC Limited- KOTESHWAR HEP , Tehri, Uttarakhand
- Condition monitoring of 400kV class EHV circuit breakers - 7Nos. were carried out at Koteshwar Power Station, during 5th to 15th January 2019 at site of M/s. THDC Limited-KOTESHWAR HEP, Tehri, Uttarakhand, as a part of consultancy work of Diagnostic and condition monitoring of Power station equipment.
- On- line PD test by acoustic emission technique was carried out on Generator Transformers - 4Nos. as a part of consultancy work of Diagnostic and Condition Monitoring of Power Station equipment from 28th to 31st January 2019, at site of M/s. NHPC Limited-Teesta Lower Dam Power House-4(TLDP-4)

Distribution Systems Division

- Third Party Inspection and Evaluation for Niranthra Jyothi Yojana Scheme (NJY) for M/s. Chamundeswari Electricity Supply Company (CESC)
- Third Party Inspection of High Voltage Distribution System (HVDS) for BESCOM

Power Systems Division

- Third party Protection Audit for WRTS-II: PGCIL
- Third party Protection Audit for WRTS-I: PGCIL
- Third party Protection Audit for UPPTCL, Lucknow
- SubSynchronous Resonance Studies for Series Compensation on Tumkur (Pavagada) to Tumkur (Vasantnarsapura) 400 kV D/C Line - M/s Siemens
- Testing of Fast Bus Transfer Relay on RTDS - M/s Power Research & Development Consultants Pvt. Ltd.
- Protection Audit of Pragathi Power Station –-III, Bawana New Delhi
- Relay coordination of 400 kV to 11 kV Essar Power M.P. Limited (EPMPL) Bandhora site

- System study for capacitor requirement in Northern Region for the year 2019-20 NRPC
- Protection Audit study Adani Electricity Mumbai Limited (AMEL), Mumbai
- Study the loss levels at Wind Farm near Gojanur village, Laksmeshwar Taluk - M/s Mysore Mercantile company Ltd (MMCL).
- Dynamic Testing of Protection Relays on Real Time Digital Simulator (RTDS)

  Dynamic testing of the following Numerical relays have been carried out on Real Time Digital Simulator:

- Transformer Differential Protection Relay RET 670 (ver2.2) of M/s. ABB
- Line Distance Protection Relay REL 670 (ver2.0 & ver2.2) of M/s. ABB
- Line Differential Protection Relay RED 670 (ver2.2) of M/s. ABB
- Transformer Differential Protection Relay MiCOM P643 of M/s. GE
- Line Distance Protection Relay MiCOM P444 of M/s GE have been tested for their dynamic performance as per the CIGRE document 'Evaluation of characteristics and performance of power system protection relays and protective systems' by Working Group 04 of Study Committee 34 (Protection).
- **PMU testing**

  Steady state and Dynamic compliance tests were carried out successfully on ABB make PMU RES670 - a standalone PMU using 6135A PMU calibrator. This is the first test of its kind taken up by CPRI.

Special Consultancy Activities

Cables & Diagnostics Division

- Diagnostic/ Condition Monitoring Tests on Power Transformers for M/s. NLC India Limited, TPS-I, Neyveli.
- Diagnostic/ Condition Monitoring Tests on HV Switchyard Equipment and XLPE Cables (Phase-I) for M/s. Steel Authority of India Ltd, Rourkela Steel Plant, Rourkela, Orissa.
- Condition Monitoring tests on HV Equipment for Doyang Hydro Electric Plant. M/s. North Eastern Electric Power Corporation (NEEPCO) Ltd., Wokha, Nagaland.
- Investigation and Failure Analysis Tests on 80MVA Failed Transformer of M/s. Power Transmission Corporation of Uttarakhand Limited (PTCUL), Dehradun, Uttarakhand, at Jhajra, Uttarakhand.
- Diagnostic Testing of Main Generator Unit #2, Generator Transformers (XO2), Auxiliary Transformer (XO5) and Start-up Transformer (XO3B) during Unit #2, 25th Refuelling outage for M/s. Nuclear Power Corporation of India Limited (NPCIL), Tarapur Atomic Power Station 1 & 2, Maharashtra .
- Diagnostic/ Condition Monitoring Tests on Power Transformers for M/s. Harduaganj Thermal Power Station, UPRVUNL, Kasimpur, Aligarh, U.P.

- Diagnostic/ Condition Monitoring Tests on Power Transformers for M/s. Information Tech Park Ltd., Bengaluru
- Diagnostic/ Condition Monitoring Tests on Lightning Arresters for M/s. Bengaluru Metro Rail Corporation Ltd., Bengaluru
- Diagnostic/ Condition Monitoring Tests on HV Equipment for M/s. Zuari Agro Chemicals Ltd., Goa
- Diagnostic/ Condition Monitoring Tests on HV Equipment (Phase-II) for M/s. Steel Authority of India Ltd, Rourkela Steel Plant, Rourkela
- Diagnostic/ Condition Monitoring Tests on Power Transformers for M/s. KPCL, Raichur Thermal Power Station, Shakthinagar, Raichur
- Diagnostic/ Condition Monitoring Tests on HV Equipment at Tehri and Koteshwar for M/s. THDC India Limited, Rishikesh.
- Conductor Resistance test, Sheath Resistiance Test and capacitance Measurement test on installed EHV Cable system at various sites were carrried out as part of pre-commissioning tests for the following organisations during 2018-19 :
  - Double circuit 220 kV 1200 Sq.mm XLPE Cable System for UPPTCL-Lucknow
  - 220 kV 1000 Sq.mm. XLPE Cable System & 220 kV 1200 Sq.mm. GIS Cable System for TANGENCO at Chennai,
  - 240 Sq.mm 66 kV & 66 kV 1000 Sq.mm. Cable System for KPTCL, 1X1000 Sq.mm. 66 kV XLPE Cable System for KPTCL at Bengaluru, 2000 Sq.mm. 220 kV. & 1000 Sq.mm , 66 kV. XLPE Cable System for KPTCL at Bengaluru, 1000 Sq.mm. 220 kV termination XLPE Cable, GIS Cable System for KPTCL, Bengaluru, 66 kV , 630 Sq.mm. XLPE Cable System for KPTCL, Bengaluru,

Energy Efficiency & Renewable Energy Division

- Cooling tower thermal capability testing was carried out as per CTI ATC 105 standard at the following thermal power stations:
  - Kanti Bijlee Utpadan Nigam Ltd., Muzaffarpur TPS, Kanti, Bihar (2x195 MW)
  - Simhadri Thermal Power Project, NTPC Ltd., Simhadri, A.P. (1x500 MW)
  - Vallur Thermal Power Project, NTPC, Tamil Nadu Energy Company Ltd., Chennai (1x500 MW)
  - Energy Audit of Hydro Power Station for M/s. NHPC Limited, Rangit Power Station, Sikkim (3 x 20 MW) and Tanakpur Power Station (3 x 40 MW), Uttarkhand.

High Voltage Division

- Pollution mapping with reference to transmission system in Eastern region is completed:
  - Pollution map of Eastern region: Report preparation is completed. The same presented at ERPC, Kolkata during March 2019.

- Carried out Earth Resistance measurement at the site of Koteshwar Hydro Electric Project for M/s. THDC, Tehri, Uttrakhand, on 22nd & 23rd June 2018.
- Pollution mapping for E&M works of Rewari to Dadri Section of WDFC Corridor CTP – 14 project of L&T from 10th to 16th July 2018

Metering & Utility Automation Division

MUAD, CPRI, Bengaluru rendered Smart Grid Pilot Project consultancy services for TSSPDCL, Hyderabad under the MoP initiated Smart Grid Pilot Project scheme. This project is unique and having most smart grid functionalities under the scheme.

Mechanical Engineering Division

- Design Vetting of 33kV I-Beam Pole foundation for M/s. Sharavathy Constructions, Bengaluru
- Design Vetting of 220kV D/C "PDT-20" Type Mono Pole of M/s. Valmont Structures Pvt. Ltd., Pune
- Design Vetting of 400kV D/C Type "DD 59+30m" Tower for M/s. Adani Transmission Ltd., Ahmedabad
- Design Vetting the of 220kV D/C Monopole for M/s. Bajaj Electricals, Mumbai
- Design Vetting of Foundation 220kV tower of M/s. Megha Engg. & Infrastructure Ltd., Hyderabad.
- Design Vetting of Pile foundation for 132kV D/C Tower for M/s. Vinay Construction Company PDD, Jammu.
- Design Review of 66kV D/C type 'A' Towers for M/s. PSPCL, Patiala.
- Design Review of 66kV D/C type 'C' Towers for M/s. PSPCL, Patiala.
- Design Vetting of 7m Steeped pole for M/s. Ramboll India Pvt. Ltd., Hyderabad.
- Vetting the design of 10m Steeped pole for M/s. Ramboll India Pvt. Ltd., Hyderabad.
- Design Vetting of 400kV type 'PD' Monopole for M/. Valmont Structure Pvt. Ltd., Pune.
- Design Vetting of 50m Communication Tower with Foundation for M/s. Principle ACS Engineering, Hyderabad.
- Design Vetting of 400kV D/C Type 'PB' Tension Pole for M/s. Valmont Structure Pvt. Ltd., Pune.
- Design Vetting of 50m Communication Tower with Foundation for M/s. Principle ACS Engineering, Hyderabad.
- Foundation design vetting of 132kV M/C Type 'MD (0-2 Deg.)' Tower for M/s. CSPTCL, Raipur.
- Design Vetting of 66kV M/C Type "P1-90 & P2-90" Monopoles for M/s. SLV Enterprises, Bengaluru
- Design Vetting of 40m communication Pole for M/s. Principal ACS Engg., Hyderabad.

- Design Vetting of 50m Communication Tower with Foundation for M/s. Principle ACS Engineering, Hyderabad.
- Foundation design vetting of 132kV M/C Type 'MD (0-2 Deg.)' Tower for M/s. CSPTCL, Raipur.
- Design Vetting of 66kV M/C Type "P1-90 & P2-90" Monopoles for M/s. SLV Enterprises, Bengaluru
- Design Vetting of 40m communication Pole for M/s. Principal ACS Engg., Hyderabad.
- Design checking/approval of pile foundation of 132kV D/C Ara GSS-Jagdishpur GSS Transmission Line for M/s. K Ramachandra Rao Transmission & Projects Pvt. Ltd., Hyderabad.
- Design checking/approval of structural design calculations and drawings for 60m height triangular tubular tower for M/s. Principle ACS Engineering India Pvt. Ltd., Hyderabad.
- Design checking/approval of isolated foundation design calculations and drawings for 60m height triangular tubular tower for M/s. Principle ACS Engineering India Pvt. Ltd, Hyderabad
- Design checking/approval of design reports & drawings for various type of foundations of 132 kV M/C tower type MD for M/s. Chhattisgarh State Power Transmission Company Ltd., Raipur.
- Design checking/approval of 110 kV D/C Type "NB3, NB30 & NB60" Towers for M/s. Trucon Associates, Nagpur.
- Design checking of 220 kV Type "SSPS2" Pole for M/s. Sharavathy Conductors, Bengaluru.
- Design checking of 132 kV M/C Type " MD60" tower of M/s. Chhattisgarh State Power Transmission Company Ltd, Raipur.
- Design checking of foundation for 100m Lattice mast of M/s. Shah Infra Towers Pvt. Ltd., Davangere.
- Design checking of 40m communication pole for M/s. Principle ACS Engineering, Hyderabad.
- Design checking of foundation for 132kV M/C type 'MD30' tower of M/s. CSPTCL, Raipur.
- Design checking of foundation for 40m communication monopole for M/s. Principle ACS Engg., Hyderabad
- Design checking of foundation for 220kV type 'PZ' monopole for M/s. Valmount Structures Pvt. Ltd., Pune.
- Design checking of foundation for 220/100kV M/C type 'GLA, 'GLB', 'GLC'& 'GLD' towers of M/s. KSEB, Shoranur.
- Design checking of 220kV type ''DD' tower of M/s. KEC, Mumbai
- Design of 110kV D/C type "NB3, NB30 & NB60" Narrow base towers for M/s. KSEB, Kobhikode.

- Design checking of 220kV D/C type 'DC & DD' towers of M/s. HVPNL, Panchkula.
- Design checking of 220kV Type ''PDT10, PDT20, PDT30 (38m) & PDT30 (33.7m)' Monopoles of M/s. Valmont Structure Pvt. Ltd., Pune.
- Design checking of 220kV D/C Type "DB & DC" Towers and Tower Spotting Data for M/s. KEC International Ltd., Gurgaon.
- Review of Loads of 220kV D/C towers to 132kV D/C towers with Moose conductor of M/s. K. Ramachandra Rao Transmission & Project Pvt. Ltd., Hyderabad.
- Review of Loads of 220kV D/C with GSW Vs OPGW and Tower Spotting Data of M/s. L&T, Chennai.

Ultra High Voltage Research Laboratory, Hyderabad

- Measurement of Ionic current density from ±800kV, HVDC Champa-Kurukshetra line of PGCIL near Jabalpur was carried out for PGCIL, WRTS II, Vadodara. Photographs shown below:

Measurement of Ionic current density from ±800kV, HVDC Champa-Kurukshetra line of PGCIL

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SECTION-5

PROMOTIONAL ACTIVITIES

PROMOTIONAL ACTIVITIES

Important Conferences/Workshops Organised

- **National Conference on "Switchgear and Controlgear",**

  Two days "National Conference on Switchgear and Controlgear", was organised at CPRI, Bengaluru by High Power Laboratory, CPRI, Bengaluru, on 6th & 7th December 2018.

- **National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories"**

  Two days National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories" was organised at CPRI, Bengaluru, by Mechanical Engineering Division, CPRI, Bengaluru, on 20th & 21st December 2018.

- **10th International Conference on Power Cables "CABLETECH 2019"**

  The Institute organized *10th International Conference on Power Cable Technology titled "CABLETECH 2019",* on 27th & 28th February 2019, at CPRI, Bengaluru. The Conference provided a platform to manufacturers, professionals and engineers to share knowledge and experience on the latest technology on Power Cables. Topics such as AC / DC Cables - New materials and ageing assessment, Cable and Accessories, Testing and evaluation, Diagnosis, Maintenance & Remaining Life Estimation, Manufacturing process, Installation and Laying practices, Emerging trends were covered during the two day Conference.

  An In-house exhibition was also organized during the Conference and CPRI displayed its facilities and expertise in a stall. The exhibition was inaugurated by Shri Shashi Amin, Chairman – Cables Division, IEEMA. CPRI stall showcased Research & Development, Testing & Certification, Consultancy/Field testing and Training activities of the Institute. Many delegates showed keen interest and enquired about the various unique facilities of CPRI.

Inaugural Session of the International Conference on Power Cables-CABLETECH -2019

Inauguration of the Exhibition by Shri Shashi Amin, Chairman – Cables Division, IEEMA at 10th International Conference on Power Cables- CABLETECH 2019 held on 27th & 28th February 2019

- **Two days "International Conference on High Voltage Engineering and Technology (ICHVET-2019)"**

  IEEE-Hyderabad Section in association with Central Power Research Institute (CPRI), Hyderabad organised Two days International Conference on High Voltage Engineering and Technology (ICHVET-2019), on 7th & 8th February, 2019, at Hotel The Manohar, Old Airport Exit Road, Begumpet, Hyderabad.

  Shri D Prabhakar Rao, Chairman & Managing Director, TSTRANSCO & TSGENCO, Hyderabad and Ex-Officio Special Chief Secretary, Telangana inaugurated the Conference in the presence of Shri V S Nandakumar, Director General, CPRI, Dr. N. Vasudev, Additional Director & Group Head, CPRI Bengaluru and Dr. Pradeep M Nirgude, Additional Director & Unit Head, UHVRL-CPRI, Hyderabad. A Conference Souvenir was also released during the inaugural function. Shri S V N Jithin Sundar, Executive Director, Corporate R&D, Bharat Heavy Electricals Limited delivered keynote address.

  In total 156 participants from various organizations including foreign nationals from Switzerland, Germany, Kenya attended the Conference. In six technical sessions, 57 technical papers were presented by the authors on the recent topics of the Conference theme. In addition three technical lectures were also delivered from eminent personalities from Industries.

Awards & Accolades

- Shri Rajaramamohanarao Chennu, Engineering Officer Gr-3, High Power Lab., CPRI, Bengaluru received best paper award (3rd Prize) in TECH-IT 2018 Conference for presenting

technical paper titled "CPRI experience on Internal arc testing of Current Transformers and its failure analysis", held at Hotel Crown Plaza, Gurgaon, NCR, on 13th & 14th December 2018.

Shri Rajaramamohanarao Chennu, Engineering Officer Gr-3, High Power Lab., CPRI, Bengaluru receiving the best paper award

UHVRL, Hyderabad

- The technical paper titled "Performance test on 1200kV, AC voltage measuring system of CPRI, UHVRL, Hyderabad" authored by Dr. P Rajamani, Engineering Officer Gr.3, UHVRL-CPRI, Hyderabad awarded the "best oral paper award (First)" in National Conference on Electrical and Electronics Measurements (NCEEM-2018), organised by CSIR – National Physical Laboratory, New Delhi, on 19th & 20th September 2018.

Participation in Conferences/Exhibitions

INDIAN TECHNOLOGY CONGRESS -2018:-

1) Indian Technology Congress (ITC) -2018 was held in NIMHANS Convention Centre, Bengaluru, on 5th & 6th September 2018, with the theme "Technology First: Making India Innovate, Excel Globally and Prosper".

   ITC -2018 was inaugurated by Shri.H.D.Kumaraswamy, Honorable Chief Minister of Karnataka. The event discussed technological and operational issues; and contemporary digital technologies with theme based technical sessions focusing on innovation, best practices & industry engagement.

CPRI sponsored the event and set up a stall displaying its facilities and credentials. The stall was visited by Members from Industry, Research organizations, Government and Academia who showed keen interest in the activities carried out by CPRI.

Photograph of the event are placed below: -

Visitor at CPRI Stall

2) POWEREX THAILAND -2018 & Electric Asia Exhibition

Central Power Research Institute (CPRI) participated in PowerEx Asia 2018 organized at Impact Exhibition Centre, Bangkok, Thailand, from 6th to 8th September 2018. Sri B.M Mehra, Additional Director, STDS-CPRI, Bhopal and Sri Ramadas, Engg Officer, Information & Publicity Division, CPRI, Bengaluru were deputed for manning the stall. CPRI stamped the presence by setting up a Stall and promoted CPRI services at the Exhibition. Footfalls to CPRI stall were approximately 100 Visitors / Customers. CPRI showcased and marketed the Test Facility, Consultancy Services and Training programme to visitors / delegates. Electrical Manufacturers, Industry Professionals, Utilities and Students visited CPRI stall. Overall CPRI participation was a fruitful.

Photograph of the event is placed below: -

CPRI Officers along with delegates at POWEREX THAILAND 2018 & Electric Asia Exhibition

3) E3-2018:-

Central Power Research Institute (CPRI) participated in E3-2018 exhibition, held at Nicco Park, Big Lawn, Kolkata, from 14th to 16th December 2018. Shri Anand.S, Engineering Officer, CPRI, Bengaluru along with Dr.P.K.Maiti, Unit Head & Joint Director, RTL-CPRI, Kolkata were deputed for manning the stall. CPRI stamped its presence by setting up a stall and showcased CPRI services at the Exhibition. Footfalls to CPRI stall were more than 150 visitors including Manufacturers, Students, Customers, VIPs etc. Deputy Chief Minister of Tripura and Principal Chief Engineer of Energy & Power Department, Sikkim has visited the CPRI stall and expressed the interest towards CPRI services.

Photograph of the event is placed below: -

CPRI Officers along with delegates at the stall

4) VIBRANT GUJARAT TRADE SHOW: -

Central Power Research Institute (CPRI) participated in Vibrant Gujarat Global Trade Show – 2019, organized at The Exhibition Centre, Gandhinagar, Gujarat from 18th to 22nd January 2019, under the integrated power pavilion. CPRI stamped it's presence by setting up a stall and promoted CPRI services at the exhibition. Sri Manoj Kumar Jaiswal, Joint Director, RTL-CPRI, Noida and Sri Somala Arjuna Rao, Engg. Officer Gr.3, Short Circuit Laboratory, CPRI, Bengaluru manned the CPRI stall. Footfalls to CPRI stall were more than 400 Visitors / Customers. More than 200 Visitors/Customers have enrolled their details in the Visitors diary, including foreign visitors.

Honourable Prime Minister of India Sri Narendra Modi inaugurated the Power Pavilion and inaugurated the event on 17th January 2019.

Photograph of the event is placed below: -

Director, MoP had a glance at CPRI, Stall

Visits of Important Persons / Foreign Delegations to CPRI

Cables & Diagnostics Division

- Mr. Altaf Ahmed, Riyadh Cables Group and Mr. Mazin Aziz, DEWA, DUBAI, UAE visited Cables & Diagnostics Division, CPRI, Bengaluru for witnessing the Type tests on 11 kV, 3C x 300 sq.mm CU/XLPE/LAT/SWA/PE Cable as per IEC 60502-2-2014, for M/s. Riyadh Cables Group, Riyadh

- Mr. Shahbas Rawal, National Cable Industry and Mr. Humaid Alshamsi, DEWA, Dubai, UAE visited Cables & Diagnostics Division, CPRI, Bengaluru for witnessing the Type tests on 0.6/1.0, 4C x 185 sq.mm. AL/XLPE/PVC/ SWA/PVC cable as per IEC 60502-1-2009 for M/s. National Cable Industry, Sharjah, UAE

Dielectric Materials Division

- Mr. Zyryanov Oleg, Project Manager, Mr. Kolokolnikov Vladislav, Chief Engineer, Mr. Alexander Shanin, Service Engineer from M/s. NPO Dekanter, Russia, visited Dielectric Materials Division, CPRI, Bengaluru for installing and commissioning of PCB de-chlorination unit and sodium dispersion unit, during 06th April 2018 to 25th July 2018.

- Mr. Rene Van Berkel, UNIDO representative India, visited Dielectric Materials Division, CPRI, Bengaluru to review the commissioning progress made by NPO Dekanter team, on 7th June 2018. A discussion was held between NPO Dekanter, CPRI officers and UNIDO representatives regarding the commissioning of mobile de-chlorination unit and schedule for treatment of 750 MT of PCB contaminated oil in India.

Meeting held between UNIDO Representatives, NPO dekanter and CPRI officers. Mr. Rene Van Berkel interacting with Mr. V.S. Nanda Kumar, Director General- CPRI, Dr. Ramesh Babu, Director, CPRI, Dr. P. Thomas, Additional Director, CPRI, Dr. S.P. Dhua, UNIDO, Mr. Oleg Zyranov, NPO Dekanter and CPRI officers.

- Dr. Luciano A Gonzalez, UNIDO consultant, visited Dielectric Materials Division, CPRI, Bengaluru, on 25th July 2018, for the optimization of mobile de-chlorination unit and verified whether each individual PCB team member can operate safely on mobile de-chlorination unit and sodium dispersion unit.

- Dr. Luciano A Gonzalez, UNIDO consultant, visited Dielectric Materials Division, CPRI, Bengaluru, and helped CPRI team to conduct trial runs on PCB de-chlorination unit from 29th October 2018 to 7th November 2018.

Electrical Appliances Technology Division

- Shri Sabyasachi De – General Manager-HRD, WBSEDCL, Kolkata attended the Inaugural function of the Induction Training Programme for Engineers of M/s. WBSEDCL, Kolkata (Batch 35), held at CPRI, Bengaluru, on 14th January 2019.
- Shri Abhay Bakre DG, BEE visited Refrigerator Laboratory and Air Conditioning Laboratory of Electrical Appliances Technology Division, CPRI, Bengaluru, on 9th November 2018. Detailed discussion were held about the sample status of BEE in the Division.
- Dr. B.S. Negi, Adviser, Ministry of New and Renewable Energy visited Battery Testing Laboratory of Electrical Appliances Technology Division, CPRI, Bengaluru and saw the battery test facilities and held discussion on draft for series guideline for the testing of Solar Batteries, on 29th January 2019.

Earthquake Engineering & Vibration Research Centre

- Mr. Kamakura Akira from Japan visited Earthquake Engineering & Vibration Research Centre (EVRC), CPRI, Bengaluru for witnessing D- EHC Type Test-Vibration testing, on 26th and 27th December 2018.
- Mr. Lee Youngbae from Korea visited Earthquake Engineering & Vibration Research Centre CPRI, Bengaluru for discussion regarding Seismic testing, on 26th February 2019
- Mr. Heo Yong Seok from Korea visited Earthquake Engineering & Vibration Research Centre, CPRI, Bengaluru for discussion regarding Seismic testing, on 26th February 2019
- Mr. Lim Moon Taek from Korea visited Earthquake Engineering & Vibration Research Centre, CPRI, Bengaluru for discussion regarding Seismic testing, on 26th February 2019
- Mr. Kiryukhin Pavel & Mr. Borichev Nikolai from Russia visited Earthquake Engineering & Vibration Research Centre, CPRI, Bengaluru for finalization of seismic and snap back test schedule for 800 kV & 420 kV Bushing, on 28th March 2019.

High Voltage Division

- Mr Ahmed M Fayed and Mr Khalid Ahmed of M/s. DEWA, UAE visited High Voltage Division, CPRI, Bengaluru for witnessing Impulse Test on 1000kVA Transformer of M/s. Eurogulf Transformers FZE, U.A.E. conducted on 31st October 2018.

Visit of Mr. Ahmed M Fayed and Mr. Khalid Ahmed of M/s. DEWA, UAE

- Shri R Venkatachalam - Dy. Manager, Inspection & Testing, M/s ABI, Rishra and Mr Er. Horacio Parisi, M/s. Transba S.A. Argentina & Mr. Er. Eduardo Nasarov, Ms. Saat Electropower S.A. Argentina visited High Voltage Division, CPRI, Bengaluru for witnessing Radio Interference Voltage Test on 11kV Disc Insulator of M/s. Aditya Birla Insulators, Kolkata., on 12th October 2018.

- Shri Zameer Ahmed & Mrs. Alka Singh of M/s Karamtara Engineering, Mr. Gorgia Rodriguez Fabio Andres, Mr. Basto Aluja Jorge Enrique and Mrs. Ruiz Villa Diego of M/s. Analista Ingenieria Lines Transmission, Colombia, visited High Voltage Division, CPRI, Bengaluru for witnessing Radio Interference Voltage Test on 230kV Double Tension String of M/s. Karamtara Engineering, Boisari, on 10th April 2018.

- Mr.Tran Trong Thao, The Southern Vietname Power Project Management Board (SPMB), Mr. Nguyem Ngoc Duong, the Southern Vietnam Power Project Management Board (SPMB), Mr. LyPhuc Lac, Power Transmission Company 4 (PRTC4), Mr. Luu Vinh Phu, National Power Transmission Service (NPTS), Mr. Wang Hong Yu, CTC Insulator Co., Ltd., China visited High Voltage Division, CPRI, Bengaluru for witnessing Wet Power Frequency Voltage Test on 123kV Post Insulator of M/s. CTC Power Equipment Co. Ltd., China, conducted on 24th September 2018.

Mechanical Engineering Division

- Mr. Manoj Babu M, Testing Engineer & Ms. Viji Raj, QSE, C&C, M/s. Ducab Aluminium Company, Dubai AAAC YEW (HC) Conductor (37 / 4.06mm) visited Mechanical Engineering Division, CPRI, Bengaluru for witnessing Type Test on ACSR Zebra, Cundar & Quail Conductor on 7th & 8th August 2018

- Mr. Mohamad Zakir Abd Rashid & Mr. Muhammad Yasser Bin Mohd Sabri from M/s. Tenaga Nasional Berhad (TNB), Malaysia, Ms. Nurul Faza Nabilah Binti Muhamad, Mr. Ahmad Asyraf Izzuddin Bin Abu Bakar & Mr. Puli Narayana from M/s. LARICO-LISB Joint Venture, Malaysia and Mr. Muhammad Saffa Abqari Bin Azmi from M/s. Rohas-Euco Industries BHD, Malaysia visited Mechanical Engineering Division, CPRI, Bengaluru for witnessing Mechanical Strength Test on 275 / 132kV M/C Type "3423PSL+0M" Suspension Pole on 28th April 2018 and 275 / 132kV M/C Type "3423PS+0M" Tension Pole on 4th & 5th May 2018

Visit of Mr. Mohamad Zakir Abd Rashid & Mr. Muhammad Yasser Bin Mohd Sabri from M/s. Tenaga Nasional Berhad (TNB), Malaysia, Ms. Nurul Faza Nabilah Binti Muhamad, Mr. Ahmad Asyraf Izzuddin Bin Abu Bakar & Mr. Puli Narayana from M/s. LARICO-LISB Joint Venture, Malaysia and Mr. Muhammad Saffa Abqari Bin Azmi from M/s. Rohas-Euco Industries BHD, Malaysia

- Mr. Frederick Mukasa, Mr. Samuel Ssemanda Musoke & Mr. Julius Buzibwa from M/s. Uganda Electricity Transmission Company Ltd., Uganda and Mr. Gerhard Cornelius Vermeulen from M/s. Intec GOPA International Energy Consultants, Germany visited Mechanical Engineering Division, CPRI, Bengaluru for witnessing Mechanical Strength Test on 400kV D/C Type " DC / DD Tower, from 13th to 16th June 2018.

Visit of Mr. Frederick Mukasa, Mr. Samuel Ssemanda Musoke & Mr. Julius Buzibwa from M/s. Uganda Electricity Transmission Company Ltd., Uganda and Mr. Gerhard Cornelius Vermeulen from M/s. Intec GOPA International Energy Consultants, Germany

- Mr. Jay Kumar Sah from Nepal Electricity Authority., Nepal & Mr. Fan Huiping & Mr. Xu Pan from ETERN-CCCE-FEPEC JV, China visited Mechanical Engineering Division, CPRI, Bengaluru for witnessing Mechanical Strength Test on 132kV D/C Type "DC" Tower, on 4th & 5th March 2019.

- Mr. Thark Bahadur Thapa from Nepal Electricity Authority., Nepal & Mr. Fan Huiping & Mr. Xu Pan from ETERN-CCCE-FEPEC JV, China visited Mechanical Engineering Division, CPRI, Bengaluru for witnessing Mechanical Strength Test on 132kV D/C Type "DD" Tower on 11th & 12th March 2019.

Visit of Mr. Thark Bahadur Thapa from Nepal Electricity Authority., Nepal & Mr. Fan Huiping & Mr. Xu Pan from ETERN-CCCE-FEPEC JV, China

Power Systems Division

- Dr. Om Nayak, President, Nayak Corporation, USA and Mr. Paul Forsyth, Vice President at RTDS Technologies Inc., Canada visited Power Systems Division, CPRI, Bengaluru, for Technical Discussions on upgradation of Real Time Digital Simulator supplied by RTDS Technologies, Canada and solving some of the problems faced on RTDS, on 2nd March 2019.

Short Circuit Laboratory

- Mr. Vivek, Technical Expert from M/s. Dubai Cable Co. Pvt. Ltd., Dubai and Mr. Nikesh Kumar, Manager – Quality from M/s. L & T Construction, Lucknow visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Thermal Short circuit test through metallic screen and armour at 1kA rms for 3 seconds carried out on 1 x 400 sq.mm Aluminium conductor XLPE insulated Copper wire screened double aluminum tape armoured LSZH sheathed 19/33kV Cable, for M/s. Dubai Cable Co. Pvt. Ltd., Dubai, UAE, as per Customer's instructions, on 27th April 2018.

- Mr. Abu Taher, Mr. Mohammad Fazlur Rahman & Mr. Tahidul Islam from M/s. Automation Engineering, Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing Ability to withstand the dynamic effects of short circuit test carried out on 100kVA 11/0.415kV Three Phase Distribution Transformer, for M/s. Automation Engineering, Chittagong, Bangladesh, on 8th & 9th May 2018

- Mr. Kornchan Jeeyachok & Mr. Kittipong Pradidkaew from M/s. Precise Electric Manufacturing Co. Ltd., Thailand visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the ability to withstand the dynamic effects of short circuit test & Temperature-rise tests carried out on 160kVA 22/0.400kV & 160kVA 33/0.400kV Three Phase Distribution Transformers, for M/s. Precise Electric Manufacturing Co. Ltd., Thailand, from 9th to 16th May 2018

Visit of Mr. Kornchan Jeeyachok & Mr. Kittipong Pradidkaew from M/s. Precise Electric Manufacturing Co. Ltd., Thailand

- Mr. Mir Mohammad Hassan Mamoon from M/s. Powermann Bangladesh Limited, Dhaka, Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing Ability to withstand the dynamic effects of short circuit & temperature-rise tests carried out on

100kVA 11/0.415kV, 200kVA 11/0.415kV & 250kVA 11/0.415kV Three Phase Distribution Transformers, for M/s. Powermann Bangladesh Limited, Dhaka, Bangladesh, from 18th to 22nd June 2018

- Mr. Rajat Majumder from M/s. Protec Electronics Ltd., Dhaka visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Ability to withstand the dynamic effects of short circuit test carried out on 250kVA 11/0.415kV Three Phase Distribution Transformer, for M/s. Protec Electronics Ltd., Dhaka, from 20th to 22nd June 2018

- Mr. Md. Habibur Rahman, Engineer & Mr. T Selvanathan from M/s. Energypac Engineering Ltd., Dhaka, Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Short-time current test at 31.5kA rms for 3s with 78.75kA peak carried out on 11kV Indoor Resin Cast Current Transformer as per IEC 61869-1 & IEC 61869-2 for M/s. Energypac Engineering Ltd., Dhaka, Bangladesh, from 27th to 29th June, 2018

- Mr. Alok Kumar Mohanty, representative from M/s. ACME Electronics Limited, Dhaka visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Ability to withstand the dynamic effects of short circuit test carried out on 200kVA 11/0.415kV Three Phase Distribution Transformers, for M/s. ACME Electronics Limited, Dhaka, Bangladesh, on 12th July 2018

- Mr. Rajeev K V from M/s. Al Hamad Industries International and Mr. Mohamed Abullal Ibrahim & Ms. Arra Alsam Al Napsi from M/s. Federal Electricity & Water Authority (FEWA), UAE visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Verification of short-circuit withstand strength test at 30 kA for 1 second and other verification tests carried out on 415V 200A Metering Cabinet & 415V 500A Feeder Pillar as per IEC 61439-1 & IEC 61439-2 for M/s. AL Hamad Industries International, UAE, from 24th to 27th July 2018

Visit of Mr. Rajeev K V from M/s. Al Hamad Industries International and Mr. Mohamed Abullal Ibrahim & Ms. Arra Alsam Al Napsi from M/s. Federal Electricity & Water Authority (FEWA), UAE

- Engr. Mohammad Warez Ali, General Manager and Mr. Pallab Paul, Dy. Manager from M/s. Navana Electronics Ltd., Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the short circuit and temperature rise test as per IEEE C57.12.90 : 2015 & IEEE C57.12.00 : 2015 on 15kVA & 37.5kVA Single Phase Pole Mounted Distribution Transformers, from 7th to 13th August 2018.

- Mr. Shibli Noman, representative from M/s. Integral Electric Company, Chittagong, Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Ability to withstand the dynamic effects of short circuit test & temperature-rise tests carried out on 200kVA 11/0.415kV & 250kVA 11/0.415kV Three Phase Distribution Transformers, for M/s. Integral Electric Company, Chittagong, Bangladesh, from 6th to 17th August 2018

- Ms. T. C. D. A Gunawardhana & Mr. Eranga Anuradha Balasuriya from M/s. LTL Transformers (Pvt.) Ltd., Sri Lanka and Mr. Nizar Kilani & Mr. Humaid Alhadidi from DEWA, Dubai visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Ability to withstand the dynamic effects of short circuit test, temperature-rise test, Determination of sound level test and all routine tests carried out on 100kVA 11/0.400kV Three Phase Distribution Transformer, as per IEC 60076-1, IEC 60076-2, IEC 60076-3, IEC 60076-5 & IEC 60076-10 for M/s. LTL Transformers (Pvt.) Ltd., Colombo, Sri Lanka, from 8th to 11th October 2018.

- Mr. Gyanmani Rai, V.P. – R & D and Operations and Mr. Ahmed M Fayed from M/s. DEWA, Dubai visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Short-time withstand current test at 8kA rms for 1s carried out on 500V 630A Three Pole Fuse Switch, as per Customer's requirement following IEC 60947-3 for M/s. Asiatic Electrical & Switchgear Pvt. Ltd., Bhiwadi, on 30th October 2018.

- Mr. P.A.R. Raju & Mr. Abdul Mukeeth from M/s. Eurogulf Transformer FZE, Sharjah, U.A.E., and Mr. Ahmed M Fayed & Mr. Khalid Ahmed from DEWA, Dubai visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Temperature-rise test & Determination of sound level tests carried out on 1000kVA 11/0.400kV Three Phase Distribution Transformer as per IEC 60076-2 & IEC 60076-10 for M/s. Eurogulf Transformer FZE, Sharjah, U.A.E., on 1st & 2nd November 2018

- Mr. Md. Shahadat Hasan & Mr. Md. Golam Moula from M/s. Sylvan Technologies Limited, Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Ability to withstand the dynamic effects of short circuit & temperature-rise tests carried out on 200kVA 11/0.415kV Three Phase Distribution Transformer for M/s. Sylvan Technologies Limited, Dhaka, Bangladesh, from 14th to 16th November 2018.

- Mr. Md. Mosaddequl Islam from M/s. Electropac Engineering Ltd., Bangladesh visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Ability to withstand the dynamic effects of short circuit test carried out on 200kVA 11/0.415kV & 250kVA 11/0.415kV Three Phase Distribution Transformers, for M/s. Electropac Engineering Ltd., Dhaka, Bangladesh, on 19th & 20th February 2019.

- Mr. Mohammad Said Minkara, Engineering & Business Support Director from M/s. Energya Power Cables (EPC), Cairo, Egypt visited Short Circuit Laboratory, CPRI, Bengaluru for witnessing the Short circuit test at 31.5kA for 1.0 s carried out through lead sheath in series

with conductor on Single core 1200 sq.mm, Aluminium Conductor, XLPE insulated, Lead Sheathed 133/230kV EHV Cable, for M/s. Energya Power Cables (EPC), Cairo, Egypt, on 1st March 2019.

Visit of Mr. Mohammad Said Minkara, Engineering & Business Support Director from M/s. Energya Power Cables (EPC), Cairo, Egypt

Switchgear Testing & Development Station, Bhopal

- Mr. Md. Saiful Islam, Asst. General Manager and Mr H.M. Rasheeq Chayan, Deputy Manager, M/s. Confidence Electric Ltd., Bangladesh, visited Switchgear Testing & Development Station, Bhopal for witnessing the Short circuit test conducted on 37.5kVA,6.35/0.240kV Single phase Transformer of M/s. Confidence Electric Ltd., Dhaka-1215, Bangladesh, on 9th April 2018.

- Mr. Kai-Uwe of M/s. SGB MY SDN BHD, Nilai, visited Switchgear Testing & Development Station, Bhopal for witnessing Internal arc fault test conducted on 11kV, 1000kVA Compact Substation of M/s. SGB MY SDN BHD, Arab – Malaysian Industrial Park, 71800, Nilai, on 12th April 2018.

- Mr. Yin Huaxin, Mr. Kuanlai Sun & Mr. Yao Yunlei of M/s. Eaton Electrical, China visited Switchgear Testing & Development Station, Bhopal for witnessing the tests conducted on 12kV, 630A, 21kArms, RVAV – K Ring Main Unit of M/s. Eaton Power Quality Pvt. Ltd., Pundicherry, from 6th to 25th June 2018.

- Mr. Md. Saiful Islam, Asst. General Manager & Mr Shajjad Hosain, Asst. Engineer, M/s. Confidence Electric Ltd., Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Short circuit test conducted on (a) 5kVA, 6.35/0.240kV Single phase Transformer (b) 15kVA, 6.35/0.240kV Single phase Transformer of M/s. Confidence Electric Ltd., Dhaka, Bangladesh, on 18th September, 2018.

- Mr. Md. Saiful Islam, Asst. General Manager & Mr. Shajjad Hosain, Asst. Engineer, M/s. Confidence Electric Ltd., Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Short circuit test conducted on (a) 100kVA, 6.35/0.240kV Single phase Transformer (b) 75kVA, 6.35/0.240kV Single phase Transformer (c) 50kVA, 6.35/0.240kV Single phase Transformer (d) 100kVA, 6.35/0.240kV Single phase Transformer (e) 100kVA, 6.35/0.240kV Single phase Transformer of M/s. Confidence Electric Ltd., Dhaka, Bangladesh, on 9th & 22nd November 2018.
- Mr. Girjesh Tiwari, Plant Manager, M/s. Federal Power Transformers LLC, Abu Dhabi, UAE, visited Switchgear Testing & Development Station, Bhopal for witnessing Short circuit dynamic withstand test conducted on 5MVA, 33/3.45kV, 3-phase Power Transformer of M/s. Federal Power Transformers LLC, Abu Dhabi, UAE, on 15th November 2018.
- Mr. Nilesh Gurjar, Manager, M/s. SGB MY SDN BHD, Nilai, Malaysia, visited Switchgear Testing & Development Station, Bhopal for witnessing Sound level test and Short circuit dynamic withstand test conducted on 4MVA, 33/0.415kV Cast Resin Dry Type Transformer of M/s. SGB MY SDN BHD, Nilai, Malaysia, on 18th November 2018.
- Mr. Ashutosh Patil, Sr Project Eng., UL - Dubai visited Switchgear Testing & Development Station, Bhopal for witnessing Short Time Withstand Strength Test conducted on 639V, 4000A, 100kA, Sandwich Busway of M/s. Underwriters Laboratories (UL), Middle East, Dubai, U.A.E., on 17th January, 2019.
- Mr. Md. Hamidur Rahman, Jr. Engineer, M/s. Confidence Electric Ltd., Dhaka, Bangladesh, visited Switchgear Testing & Development Station, Bhopal for witnessing Short Circuit Dynamic Withstand test conducted on 14/10MVA,.33/11.55kV Three Phase Power Transformer of M/s. Confidence Electric Ltd., Dhaka, Bangladesh, on 28th January 2019.
- Mr. Ashutosh Patil, Sr Project Eng., UL - Dubai visited Switchgear Testing & Development Station, Bhopal for witnessing Short Time Withstand Strength Test conducted on 1000V, 5000A, 120kA and 1000V, 2250A, 80kA Sandwich Busway of M/s. Underwriters Laboratories (UL), Middle East, Dubai, U.A.E., on 21st & 22nd February 2019.

STL DIV, STDS-CPRI, Bhopal

- Mr. Md. Saiful Islam, Additional General Manager and H.M. Rasheeq Chayan, Deputy Manager, M/s. Confidence Electric Ltd., Dhaka, Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Temperature rise test & Impulse test conducted on 5kVA, 15kVA & 37.5 kVA, 6.35/0.240kV single phase transformers of M/s. Confidence Electric Ltd., Dhaka, Bangladesh, from 10th to 18th April 2018
- Mr. Kiran Y More, Mech. Design Manager and Mr. Baburajan Kolunthu, Production HoD, M/s. SGB MY SDN BHD, Nilai, Malaysia visited Switchgear Testing & Development Station, Bhopal for witnessing the Temperature rise test and sound level test conducted on 11kV/433V, 630A/1333A Compact Substation for M/s. SGB MY SDN BHD, Nilai, Malaysia, on 11th April 2018.
- Mr. Tonmay Das and Mr. Saiful Wahab Choudhry of M/s. Energypac Engineering Ltd., Dhaka, Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Temperature rise test conducted on 20/28 MVA, 33/11.55 kV Power transformer for M/s. Energypac Engineering Ltd., Dhaka, Bangladesh, on 26th & 27th April 2018.

- Mr. Michel Soukup, Senior Expert Engineer, Laboratory MCCB from M/s. Siemens AG, Energy Management Division, Low Voltage & Products, EM LP PMI R&D MA Lab, Warner –von-Siemens, str.52,92224 Amberg, Deutschland, Germany along with Mr. Neelesh Kayal, Senior Manager, R&D, Siemens Ltd, Thane, India & Mr. Sudhakar Sapuram, Vice President-R&D, LV Components Division, C&S Electric Ltd, Noida visited various Labs in STL, Switchgear Testing & Development Station, Bhopal, to see testing facility, on 17th May 2018.
- Mr. Md. Hamidur Rahman, Engineer, Mr. Md. Abdur Rahim, Technician and Mr. Md. Rahat Hosain, Technician, M/s. Confidence Electric Ltd, Dhaka, Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Impulse withstand Voltage Test conducted at STL Division, STDS, Bhopal, on 15kVA, 6.35/0.24 kV Single phase Distribution Transformer, for M/s. Confidence Electric Ltd, Dhaka, Bangladesh, on 27th August 2018.
- Mr. Mohammad Arif Haidari- Electrical Engineer, & Mr. Sayed Abdullah Hamraz-Engineer from M/s. DABS, Kabul, Afganistan visited STL office, Switchgear Testing & Development Station, Bhopal for witnessing for witnessing test on transformers of M/s. Vijai Electricals Ltd, Haridwar, between 20th to 29th September 2018.
- Md. Shajjad Hossain, Assistant Engineer, M/s. Confidence Electric Ltd, Dhaka, Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Impulse test on 100kVA, 75kVA & 50kVA, 6.35/0.24kV Distribution transformer conducted for M/s. Confidence Electric Ltd, Dhaka, Bangladesh, on 26th & 29th October 2018.
- Mr. Nilesh Gurjar, Manager (Test Field) and Mr. Rahim Rejab, Manager, M/s. SGB MY SDN BHD, Malaysia visited Switchgear Testing & Development Station, Bhopal for witnessing Lightning Impulse Voltage withstand Test, Temperature rise test on 4000kVA, 33/0.433 kV Dry type cast resin Transformer conducted for M/s. SGB MY SDN BHD, Malaysia, on 13th & 14th November 2018
- Mr. Shajjad Hosain, Asst. Engineer, M/s. Confidence Electric Ltd., Dhaka, Bangladesh visited Switchgear Testing & Development Station, Bhopal for witnessing Lightning Impulse Voltage Withstand test conducted on 10/14 MVA, 33/11.55kV Power Transformer of M/s. Confidence Electric Ltd., Dhaka, Bangladesh, on 20th November 2018
- Mr. Ali Tawfiq Al-Sweedy, Mr. Abdul Manan Bin Tarmizi & Mr.Zulkifli Bin Mustapha from M/s. Indkom Engineering Sdn. Bhd., Selangor, Malaysia visited Station-2, Switchgear Testing & Development Station, Bhopal for witnessing verification of S.C. withstand strength test conducted on Compact Substation & Feeder Pillar, on 16th & 17th July 2018.

  Mr. Clement Stephenson Lawson from M/s Lawson Fuses Limited., U.K. visited Station-2, Switchgear Testing & Development Station, Bhopal, for witnessing Breaking Capacity Test on HRC fuses, on 21st August 2018.

UHVRL, CPRI, Hyderabad

- Ms. Frayt Oleksandra and Ms. Olga Oleksandrenko Engineers, M/s. Lviv Insulator Company, Ukraine visited UHVRL, CPRI, Hyderabad for witnessing of Dielectric, Radio Interference Voltage and Corona test performed on 3 Nos. of 400kV, Glass insulator strings of M/s. E U GIG OU, Tallinn, Estonia, from 6th to 8th August 2018. Photograph shown below :

Visit of Ms. Frayt Oleksandra and Ms. Olga Oleksandrenko, Engineers from M/s. Lviv Insulator Company, Ukraine

- Mr. Andrey Shornikov and Mr. Parel Kiryukhin of Massa LLC, Mascow visited UHVRL-CPRI, Hyderabad in connection with testing of 800 kV and 420 kV RIP Bushings, on 27th December 2018.

Information & Publicity Division (I&P Division)

- Mr. Stone Shi from M/s. LCIE China Company Ltd., China visited CPRI, Bengaluru, on 12th September 2018 to discuss the testing facility available in CPRI.
- Mr. Dorrit Zennor & Mr. Kristian Godge from M/s. K. K. Wind Solution, Denmark visited CPRI, Bengaluru, on 9th April 2018. Information & Publicity Division had arranged lab. visit to Earthquake Engineering & Vibration Research Centre (EVRC), Electrical Appliances Technology Division (EATD), Short Circuit Lab. (SC Lab.) and Capacitor Division
- Mr. Harish Mittal from The Dedicated Freight Corridor Corporation of India Limited (DFCCIL) visited CPRI, Bengaluru, on 26th April 2018. Information & Publicity Division had arranged lab visit to Mechanical Engineering Division (MED), Materials Technology Division (MTD) and Insulation Lab.
- Mr. Chai Xinghai, Director of Southeast Asia, Mr. Kang Jianjun, Vice President of M/s. TBEA, China and Mr. Abhijit Das Gupta, Director of M/s. Garden Power Tech, Bengaluru visited CPRI, Bengaluru, on 4th June 2018. The delegation visited High Power Lab.
- Dr. Sudipta Banerjee and Mr. P. D. Gupta from M/s. L. S. Davar & Co., Kolkata, Patent Attorneys of CPRI visited CPRI, Bengaluru, on 20th June 2018 and held meeting regarding pending application of patents and review status of each patent applications filed etc. Dr. K. T. Varughese, HoD & Additional Director, Information & Publicity (I&P) Division chaired the meeting attended by Officers of I & P Division.
- Mr. Ahammad Abdulla Ibrahim Mohammad and Ms. Afra Abdulla Mohamad of M/s. FEWA, UAE visited to CPRI, Bengaluru, on 23rd July 2018. I & P Division had arranged lab. visit to High Power Lab, High Voltage Division, Earthquake Engineering & Vibration Research Centre and Cables Laboratory.

- Mr. Mohammed. O. Bahamdan, Chief strategy and Business Development officer, Mr. Nasser Alqahtani, Industrial laboratories Manager, Hamad Alfayez, Consultant of M/s. GCC Electrical Equipment Testing Laboratory and Mr. Fahad Saleh Al-Ismail, Consultant, Prime Energy for Power Engineering Services, Dammam, Saudi Arabia visited CPRI, Bengaluru, from 2nd to 6th August 2018. I&P division had arranged meeting with M/s. GCC representative and DG with HoDs of Power Systems Division, Mechanical Engineering Division, Short Circuit Laboratory, High Voltage Division and High Power Laboratory. The delegation also visited Dielectric Materials Division, Materials Technology Division, Short Circuit Lab., High Voltage Division, High Power Laboratory, Earthquake Engineering & Vibration Research Centre, Heat Run Test Laboratory and Cables division.

- Mr. Andrey Shornikov, Mr. Dmitriy Orekhov from M/s. Massa LLC (Izolyator Company), Russia and Dr. Ashok Singh Chief of India Operations, M/s. Massa LLC (Izolyator), New Delhi accompanied by Mr. Ramappa and Mr. Anup from M/s. Mehru Electricals, New Delhi visited CPRI, Bengaluru on 13th August 2018. Information & Publicity Division had arranged meeting with Russian representative with DG, CPRI and also arranged lab visit to High Power Laboratory, Earthquake Engineering & Vibration Research Centre, Heat Run Test Laboratory & High Voltage Division.

- Mr. Streltsov Aleksandr & Mr. Gasull Anguera Ramon of M/s. Weidmuller of Germany and Mr. Venkatesh Ramu & Mr. Pradeep. N from M/s. Weidmuller of India visited CPRI, Bengaluru, on 30th November 2018. I & P Division had meeting with German representative and also arranged lab. visit to EVRC & Insulation Lab.

- Capt. Manish Gupta, P. M. of Indian Navy visited CPRI, Bengaluru, on 29th & 30th November 2018. I&P Division had meeting with Navy officers and also arranged lab. visit to HPL & SC Lab.

- Dr. Ashok Singh, Chief of India Operations from M/s. Massa LLC (Izolyator Company), New Delhi visited CPRI, Bengaluru, on 26th December 2018 accompanied with Russian counterparts for discussions and finalization of testing of 800kv, 2000A & 420 kV, 3000A Bushings at CPRI, Bengaluru and UHVRL, Hyderabad respectively. Additional Director, I& P Division received the guests accompanied with Officers of I & P and briefed about CPRI testing facilities. The delegates visited EVRC Lab. Delegates also visited UHVRL-CPRI,Hyderabad unit on 27th December 2018 for discussions with UHVRL team.

- Mr. Pavel, Mr. Nikolai, from M/s. MASSA LLC, Russia and Dr. Ashok Singh Chief of India Operations of M/s. Massa LLC, New Delhi accompanied with Mr.Anoop of M/s.Mehru Electricals, New Delhi visited CPRI, Bengaluru, on 28th March 2019. I&P Division had arranged lab. visit to EVRC for discussions on testing of 400 kV & 800 kV insulator.

- Mr. J. R Samuel, Managing Director, M/s. Stellar Management Consultants Pvt. Ltd., Bengaluru visited CPRI, Bengaluru, on 29th March 2019 for discussion regarding implementation of ISO-IEC 17020. A meeting was held with Director General-CPRI regarding implementation of accreditation.

Important Events

Annual Customer Meet 2018: -

- The Institute organised the Annual Customer Meet- 2018, at CPRI, Bengaluru, on 24th August 2018. About 70 Senior Representatives from Utilities and Industries across the country participated in the Meet. CPRI presented Action Taken Report on the suggestions of the Customers made during the previous Customer Meet- 2017, and presented on the New and Upgraded test facilities. CPRI welcomed the suggestions from customers. "Valued Customer Awards" were presented in four categories namely viz., Research & Development, Testing & Certification, Consultancy/Field Testing, Training. This year, CPRI has introduced Valued Customer Award for "Overseas Customer" and "New Customer" under the Category of Testing & Certification. The programme ended with laboratory visits. There was a fruitful interaction with the customers.

Photographs are placed below:

Opening Remarks by Director General, CPRI

Director General with CPRI Customers & CPRI officials during Annual Customer Meet 2018

State Level Painting Competition on Energy Conservation

- Bureau of Energy Efficiency (BEE) under the Ministry of Power (MoP), Government of India (GoI) has initiated "National Awareness Campaign on Energy Conservation-2018", in which Painting Competition on Energy Conservation was organized for school children in all the States and Union Territories in the country for the year 2018. Central Power Research Institute (CPRI) was identified as the Nodal Agency for implementation of the scheme in Karnataka State through Department of Public Instruction, Government of Karnataka for the year 2018.

- The State Level Painting Competition on Energy Conservation -2018 was held in the premises of Centre for Collaborative and Advanced Research (CCAR), CPRI, Bengaluru, in the morning of 14th November 2018. The Prize distribution function of the Painting Competition was held at S.J Auditorium, CPRI, Bengaluru, in the evening. The Competition was well attended by both Category- A & Category-B participants and we had a participation of 49 students from Category- A and 47 students from Category-B.

- The prize distribution function was presided by the Chief Guest Dr. Shalini Rajneesh, Principal Secretary, Education Department, Govt. of Karnataka, and Dr. N. Vasudev, Additional Director, CPRI, Bengaluru graced the function as Guest of Honour. The Programme was co-ordinated by Dr. M G Ananda Kumar, Joint Director and State Nodal Officer, CPRI, Bengaluru. Prizes were distributed to the winners of both Category- A & B. The programme was well attended by about 300 audiences.

Chief Guest Dr. Shalini Rajneesh, IAS, Principal Secretary, Education Department, Govt. of Karnataka speaking at the State Level Painting Competition on Energy Conservation-2018 Award Distribution Ceremony

- Shri M K Jaiswal, Joint Director, RTL-CPRI, Noida was the Co-ordinating officer for Painting Competition on "National Awareness Campaign on Energy Conservation-2018". The Painting Competition was held at PGCIL, Gurgaon & NTPC, Badarpur, Delhi, on 12th December 2018. The prize distribution was held at Vigyan Bhavan, New Delhi, on 14th December 2018, on Energy Conservation Day, organized by BEE under Ministry of Power.

CENTRAL POWER RESEARCH INSTITUTE

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SECTION-6

TRAINING ACTIVITIES & PROGRAMMES

TRAINING ACTIVITIES & PROGRAMMES

Seminars / Conferences / Workshops / Training Programmes organised by CPRI during the year 2018-19

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

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

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

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

Workshops / Seminars / Conferences /Training Programmes/Tutorials organized by CPRI during the year 2018-19:

Capacitors Division

1. On-site training program on "Overview of Condition Monitoring & Diagnostic testing of EHV Circuit breakers, Hydro Generators and Generator Transformers", held at THDC India Ltd., Rishikesh, Uttarakhand, on 4th January 2019.

2. On-site training program on "On-line diagnosis of power transformers for Partial discharges and hotspots- by Acoustic emission technique", held at NHPC-Teesta Lower Dam Power house-IV(NHPC-TLDP-4), NHPC, Kalijhora, West Bengal, on 31st January 2019

3. Workshop on "Testing, Evaluation & Application of Capacitors for Reactive Power Compensation in Low Voltage AC Power Systems", held at CPRI, Bengaluru, on 14th March 2019.

4. Workshop on "Capacitors for Reactive Power Compensation in High Voltage AC Power Systems", held at CPRI, Bengaluru, on 15th March 2019

Cables & Diagnostics Division

5. On-site workshop on "Diagnostic testing & Condition Assessment of HV Power plant equipment" for O&M engineers of DHEP, NEEPCO, at Doyang, Nagaland, on 27th May 2018

6. On-site workshop on "Diagnostic testing & Condition Assessment of High Voltage Power plant equipment with specific reference to power cable system", at Rourkela Steel Plant, Rourkela, on 23rd June 2018.

7. On-Site Training Program on "Diagnostic testing & Condition Assessment of HV Power Plant Equipments for O & M Engineers", held at NHPC, Chamera Power Station-I, Chamba, Himachal Pradesh, on 29th January 2019.

8. Two days International Conference on Power Cables "CABLETECH 2019", held at CPRI, Bengaluru, on 27th & 28th February 2019.

Distribution Systems Division

9. Workshop on "Power Distribution Technologies and Current Scenario in Power Distribution", was held at CPRI, Bengaluru, on 8th March, 2019.

Dielectric Materials Division

10. Tutorial Programme on "Insulating fluids (New and In-service) and their acceptance Tests and standard Test methods held at CPRI, Bengaluru, on 6th & 7th September 2018 .

11. Tutorial Programme on "Diagnostic Monitorig of power transformers by liquid dielectric evaluation – Dissolved Gas Analysis and Furan Analysis and Degree of Polymerization with case studies", held at CPRI, Bengaluru, on 6th & 7th September 2018.

12. Training & Awareness program Condition monitoring of transformer by oil analysis & safe handling of PCB contaminated oil in transformers, held at Chandrapur Super Thermal Power Station(CSTPS), Chandrapur, on 4th August 2018 .

13. Training & Awareness program Condition monitoring of transformer by oil analysis & safe handling of PCB contaminated oil in transformers, held at Narora Atomic Power Station (NPCIL), Narora, U.P., on 26th September 2018.

14. Training & Awareness program Condition monitoring of transformer by oil analysis & safe handling of PCB contaminated oil in transformers, held at Power Transmission Corporation of Uttarakhand Limited(PTCUL), Deharadun, Uttarakhand, on 11th October 2018 .

Electrical Appliances Technology Division

15. One day Workshop on "Ingress Protection testing", held at CPRI, Bengaluru, on 15th November 2018.

16. One day Workshop on "Opportunities and Challenges of Battery Based Energy Storage System", held at CPRI, Bengaluru, on 27th February 2019.

Energy Efficiency & Renewable Energy Division

17. Training programme on "Thermal Power Plant Optimization", held at Hwange Thermal Power Station, Zimbabwe, for officials of Zimbabwe Power Company (ZPC), from 21st May 2018 to 3rd June 2018.

18. Training programme on "Thermal Power Plant Optimization", held at Hwange Thermal Power Station, Zimbabwe, for officials of Zimbabwe Power Company (ZPC), from 4th to 15th June 2018.

19. International Training programme on "Testing of Solar water pumping systems", for M/s. RETS, Kathmandu, Nepal, held at CPRI, Bengaluru, from 4th to 6th February 2019.

20. National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st & 22nd February 2019.

21. One day Training Programme on "Energy auditing of Hydro power plants", held at M/s. NHPC, Tanakpur, Uttarakhand on 11th February 2019.

Earthquake Vibration & Research Centre

22. Tutorial on "Vibration and Seismic Testing of Equipment", held at CPRI, Bengaluru, on 15th February 2019.

High Voltage Laboratory

23. Workshop on 'Choice of Insulation in High Voltage Transmission System for different Environment Conditions', held at CPRI, Bengaluru, on 6th April 2018.

24. Workshop on "Dielectric testing of Transformers, Insulators & Circuit Breakers", held at CPRI, Bengaluru, on 31st August 2018 .

25. Workshop on "Grounding Practices", held at CPRI, Bengaluru, on 12th December 2018.

High Power Laboratory

26. Tutorial on 'Testing requirements for MV Switchgear & facilities available at HPL with reference to IEC:62271-100', held at BEL, Bengaluru, on 3rd November 2018.

27. National Conference on "Switchgear and Controlgear" held at CPRI, Bengaluru, on 6th & 7th December 2018.

Insulation & HRT

28. National Seminar on "Temperature Rise Tests on Transformers and Control Panels – Methodology and findings, Environmental effects and its significance on outdoor panels", held at CPRI, Bengaluru, on 16th November 2018.

Materials Technology Division

29. Workshop on "Power Plant Optimization", for Zimbabwe Power Company officials held at Hwange Thermal Power Station, Zimbabwe, from 28th May 2018 to 8th June 2018.

30. Workshop on "Materials characterization & Evaluation using advanced techniques", held at CPRI, Bengaluru, on 23rd & 24th August 2018.

31. National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

32. Training Programme on "Coal Quality Impact on Boiler and Fly ash Utilization", held at Bellary Thermal Power station, Bellary, on14th March 2019.

Mechanical Engineering Division

33. National Seminar on "Development and Wrecks in Overhead Transmission Line Components and Accessories", held at CPRI, Bengaluru, on 12th October 2018.

34. National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

Metering & Utility Automation Division

35. One day Workshop on "Smart Grid Communications and Cyber Security Systems", held at CPRI, Bengaluru, on 17th December 2018.

36. One day Workshop on "Prepaid Energy Meter Testing Methodologies", held at CPRI, Bengaluru, on 11th January 2019.

37. Two days Workshop on "Smart Power and Automation", held at CPRI, Bengaluru, on 17 th & 18th January 2019.

38. One day National Seminar on "Smart Grid, Smart Meter and Communication Technologies", held at CPRI, Bengaluru, on 25th February 2019.

Power Systems Division

39. One day Workshop "Cyber Security for Renewable Energy", held at CPRI, Bengaluru, on 8th June 2018.

40. Two days Workshop on "Power Quality Standards (PQs)", held at CPRI, Bengaluru, on 14th & 15th June 2018.

41. One Day Workshop on "Power System Grid Operation using Synchrophasor Technology", held at SLDC, MPPTCL, Jabalpur, on 15th October 2018.

42. Workshop on "Internet of Things (IoT) with Smart Grid", held at CPRI, Bengaluru, on 29th & 30th November 2018.

43. One day workshop on "Cyber Physical Systems Security for Smart Grid", held at CPRI, Bengaluru, on 4th January 2019.

44. One day training programme on "Hands on Phasor Measurement Unit (PMU) School", held at CPRI, Bengaluru, on 25th January 2019.

45. Two day workshop on "Real Time Power System Simulation", held at CPRI, Bengaluru, on 24th & 25th January 2019.

46. Workshop/ Hands on training on "Protection Relay School-4 modules", held at CPRI, Bengaluru, from 4th to 9th February 2019, for the following modules:

    - Generator Protection
    - Transmission Line Protection
    - Distribution System Protection
    - Dynamic testing of Numerical Protection Relays using RTDS

47. One day Workshop on 'IOT with Renewable Energy', held at CPRI, Bengaluru, on 1st February 2019.

48. Three days training programme on 'Power System Protection Audit', held at CPRI, Bengaluru, from 23rd to 25th March 2019.

Research & Development Management Division

49. Two Day Workshop on "Research Methodology" was held at CPRI, Bengaluru, on 29th & 30th May 2018.

Regional Testing Laboratory, Noida

50. One day Seminar on "Recent Trends on Condition Monitoring in Power Equipments" held at Scope Complex, Lodhi Road, New Delhi, on 12th October 2018.

51. One day Workshop on "Energy Meter Testing and Evaluation", held at Hotel Ascent Biz, Sector- 62, Noida, on 19th February 2019.

Switchgear Testing & Development Station, Bhopal

52. National Conference on "Innovation & Best Practices in Transformer Design, Testing & Maintenance", held at Hotel Courtyard Marriot, DB City Mall, Bhopal, on 15th & 16th February, 2019.

53. Seminar on "Testing and Evaluation of Instrument Transformers", held at STDS-CPRI, Bhopal, on 7th December 2018.

54. One day seminar on "Latest Trends in Smart Metering Technologies", held at STDS, CPRI, Bhopal, on 16th November 2018.

55. One day workshop on "Performance Evaluation and Acceptance Criteria of Liquid Dielectrics for use in power transformers as per National and International Test Norms", held at STDS-CPRI, Bhopal, on 28th September 2018.

Short Circuit Laboratory

56. One day Seminar on "Transformer Technologies, Best Design Practices, Standards and Testing Techniques", held at CPRI, Bengaluru, on 26th October 2018.

57. One day Workshop on "Emerging Trends, Developments and Latest Testing Methodologies of Instrument Transformers" was organized by Short Circuit Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 22nd February 2019.

Training Division

58. A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL), Kolkata (Batch-31) was conducted at CPRI, Bengaluru, from 16th April to 5th May, 2018. 19 Engineers participated in the Training Programme.

59. A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata (Batch-32), was conducted at CPRI, Bengaluru, from 11th to 30th June, 2018. 20 Engineers participated in the Training Programme.

60. A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata (Batch-33), was conducted at CPRI, Bengaluru, from 9th to 28th July, 2018. 25 Engineers participated in the Training Programme.

61. A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata (Batch-34), was conducted at CPRI, Bengaluru from 4th to 25th September, 2018. 16 Engineers participated in the Training Programme.

62. A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata (Batch-35), was conducted at CPRI, Bengaluru, from 14th January to 2nd February 2019. 24 Engineers participated in the Training Programme.

63. Five day Residential Training Programme on "Testing of Electrical Equipment" for Engineers of NHPC Limited was conducted at CPRI, Bengaluru, from 4th to 8th February, 2019. 1 8 Engineers participated in the Training Programme.

64. Two day Residential Training Programme on "Transformer Oil Testing" for Engineers of TANGEDCO was conducted at CPRI, Bengaluru, on 7th & 8th February, 2019. 19 Engineers participated in the Training Programme.

65. A three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited (WBSEDCL), Kolkata (Batch-36), was conducted at CPRI, Bengaluru, from 18th February to 9th March 2019. 27 Engineers participated in the Training Programme.

66. Five day Residential Training Programme on "Testing of Electrical Equipment" for Engineers of NHPC Limited was conducted at CPRI, Bengaluru, from 11th to 15th March, 2019. 22 Engineers participated in the Training Programme.

Thermal Research Centre, Koradi

67. Training Programme on "RLA of Steam Turbine and Boiler", at Koradi Training Centre, MAHAGENCO, Koradi, on 6th & 7th December 2018.

UHVRL-Hyderabad

68. Training Programme on "High Voltage Testing of Electric Equipment", held at UHVRL, CPRI Hyderabad, on 27th July 2018.

69. Training Programme on "Testing and its significance on Instrument Transformer as per IS 16227 series", held at UHVRL, CPRI, Hyderabad, on 28th September 2018.

70. International Conference on "High Voltage Engineering and Technology (ICHVET 2019)", held at Hotel the Manohar, Hyderabad, on 7th & 8th February 2019.

Photo of the important Conference/Workshop/Training Programmes organized

Paper presentation session of the Two days International Conference on High Voltage Engineering and Technology (ICHVET-2019) organized by IEEE - Hyderabad, on 7th & 8th February 2019

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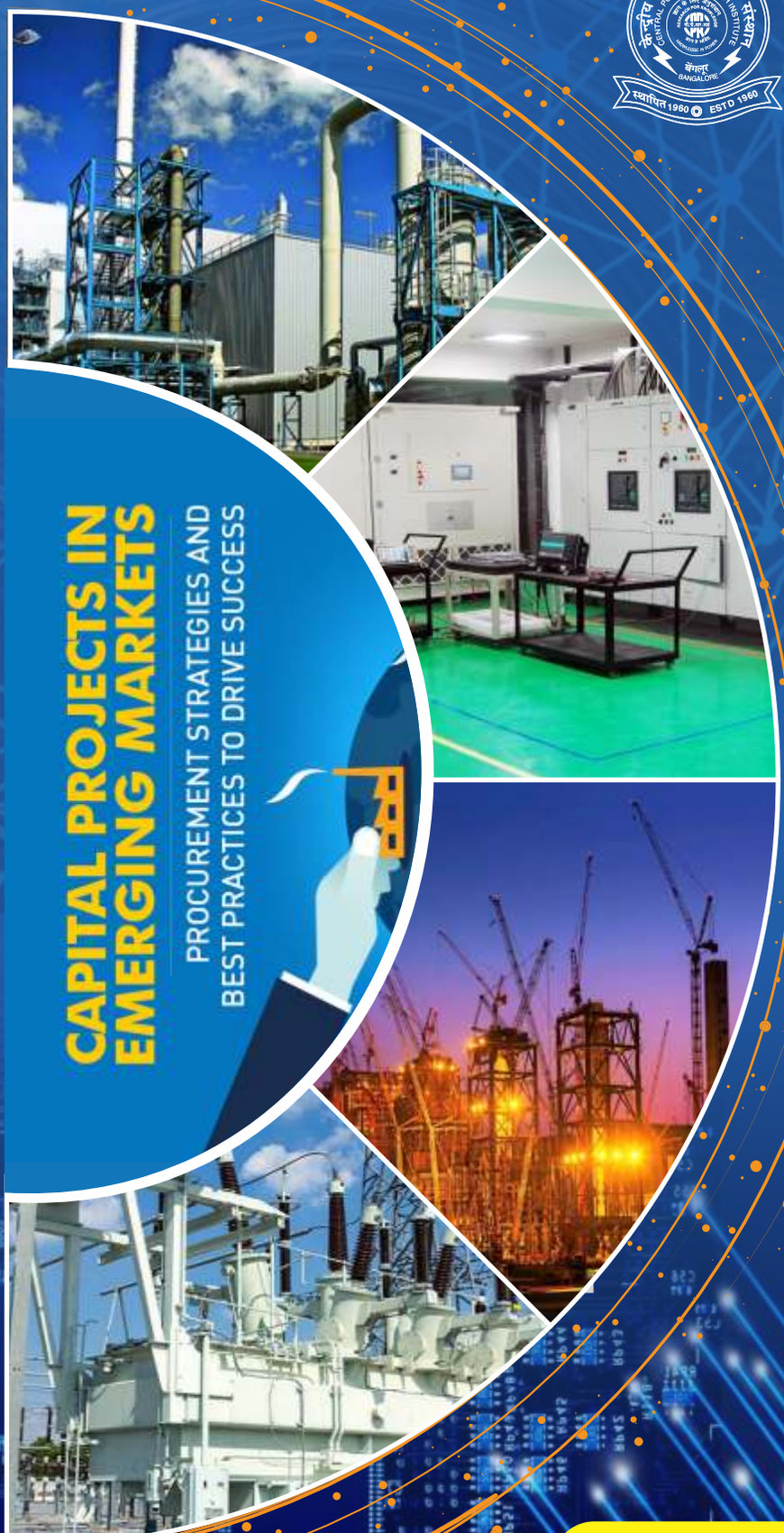

CAPITAL PROJECTS IN EMERGING MARKETS

PROCUREMENT STRATEGIES AND BEST PRACTICES TO DRIVE SUCCESS

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. Some of the projects are spilled over to XII Plan.

XI Plan Project - "Participation of CPRI as an equity partner in the J.V. Company- National High Power Test Laboratory Pvt. Ltd. (NHPTL)"

Ministry of Power has sanctioned a project under XI Plan titled "Participation of CPRI as an equity partner in the J.V. Company- National High Power Test Laboratory Pvt. Ltd. (NHPTL)" with an outlay of Rs.24.00 Crore towards payment of equity share of CPRI in J.V. Company-NHPTL, in which PGCIL, NTPC, NHPC, DVC and CPRI are J.V. Partners.

National High Power Test Laboratory Pvt. Ltd. (NHPTL), a Joint Venture Company of NTPC, NHPC, POWERGRID, DVC and CPRI has been incorporated at the cost Rs.380 Crores (Approx.) for the establishment of state-of-the-art, professionally managed, international class, On-Line High Power Short Circuit Test Facility with an Equity Debt ratio of 40:60. The equity portion is held together by the Joint Venture holders in an equal proportion of 20% each and debt portion has been funded by Power Finance Corporation (PFC).

In establishing the NHPTL, M/s. CPRI has been engaged as a Review and Management Consultant and also CPRI has been engaged for the Management of Operation & Maintenance of the Laboratory for ten years with effect from the date of commercial testing.

National High Power Test Laboratory Pvt. Ltd. (NHPTL) has started its commercial testing for online short circuit testing of 765kV class Transformers on 11th September 2017 which has now become the World's first laboratory for the same. The test facilities at NHPTL are accredited as per ISO/IEC 17025:2005 ranging from 50MVA to 520MVA, 132kV to 765kV, 1 Phase & 3 Phase Transformers.

XII Plan Proposals

CPRI has been earmarked with Rs.1,368.90 Crores by MoP, Govt. of India as Govt. Budgetary Support during 12th Plan period (2012-2017).

A project titled "Augmentation & New Facilities Projects", at a total cost of Rs.105.90 crore is approved and is under implementation from March 2014. This project is likely to be completed by March 2020.

Another Capital project with an outlay of Rs.996.10 Crores ("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 project titled "Establishment of New Test Facilities-Outlay Rs.356.10 Crores") under the 12th Five Year Plan, was approved as one project proposal by Finance Ministry & MoP vide order No.5/5/2014-T&R dated 5th January 2015 & is under implementation from April 2015.

3 YEAR ACTION PLAN PROPOSALS

"R&D Schemes of Ministry of Power being implemented through CPRI" at an estimated cost 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) & R&D under National Perspective Plan (NPP) are under implementation for the three year action plan period. The Ministry has released an amount of Rs.25.00 Crore during the Financial Year 2018-19.

The details of the XII plan projects/schemes & 3 Year Action Plan are given in the table below:

Details of XII Plan Projects/Schemes & 3 Year Action Plan:

Sl. No.	Title of the Proposal	Cost (in Crores)
I.	**'Augmentation and New Facilities Projects" of CPRI under XII Plan' at an estimated cost of Rs.105.90 Crores, comprises of following project components:**	
	(i) Upgradation of High Voltage/Ultra High Voltage Test facilities	14.00
	(ii) Upgradation of Real Time Digital Simulator	8.35
	(iii) Augmentation of Energy Meter & Calibration Laboratory	15.87
	(iv) Augmentation of Protocol and Meter Testing Laboratory	15.68
	(v) Establishment of test facility for (a) Solar PV based Grid tied Inverter systems (up to 500 kVA) and (b) Solar PV modules (up to 500 Wp)	28.00
	(vi) Augmentation, Modernization and Capacity Addition of Battery, Ingress Protection and Illumination test facilities	11.00
	(vii) Augmentation & Modernisation of Diagnostics, Cables, Capacitors, Temperature Rise test, Environmental test facilities	13.00
II.	**"Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators and associated equipment" under XII Plan, at an estimated cost of Rs.640.00 Crores, comprises of following project components:**	
	I. Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators with associated equipment at High Power Laboratory, CPRI, Bengaluru.	509.00
	II. Upgradation of Short Circuit test facilities: A. Establishment of '350 MVA on line Short Circuit Test Station' at UHV Research Laboratory, CPRI, Hyderabad B. Establishment of Short Circuit Testing of Transformers, Excitation System for existing Generator	120.00 11.00
III.	**'Establishment of New Test Facilities' under XII Plan Proposals' at an estimated cost of Rs. 356.10 Crores**	
	A. Establishment of New Transmission Tower & Seismic Test Facility	
1	Establishment of transmission line tower test station and associated facilities	90.00

2	Augmentation of test facilities at STDS-CPRI, Bhopal	20.00
3	Augmentation of Pre-Qualification test facilities at CPRI, Bengaluru	11.50
4	Establishment and Augmentation of Short Circuit test facilities at CPRI, Bengaluru.	8.50
5	Relocation and Augmentation of Thermal Research Centre (TRC), Nagpur and Expansion of the Nagpur Unit	48.00
6	Enhancing Test Facilities of Regional Oil Testing Laboratories including Relocation of RTL, Kolkata	22.10
7	Establishment of 40 kA continuous current Temperature Rise test Facility at HPL, CPRI, Bengaluru	15.00
8	Setting up of Test Facility for LV, MV & Power Cables at Western Region (Outlay:Rs.115.30 crores)	
	a) Establishment of Total Test Facility for Transformers at CPRI Western Zone	100.00
	b) Setting up of Oil Testing Laboratory in the Western Zone	5.30
	c) Establishment of Test facilities for Energy meter	10.00
9	Centre of Excellence for Non-Destructive Testing & Evaluation of Power Plant Components	8.00
10	Establishment of Phasor Measurement Unit (PMU) System Testing Calibration Lab.	6.65
11	Smart Grid Research Laboratory	11.05
IV	**R&D Schemes of Ministry of Power being implemented through CPRI**	90.8284

Physical Progress of Ongoing spill over XII Plan Capital Projects

I. Augmentation & New Facilities Project (Outlay: Rs.105.90 Cr.)

Project components:

(i) **Augmentation of Energy Meter & Calibration Laboratory**

All major items are procured except GTEM. GTEM is in advanced procurement stage. The project will be completed by March 2020.

(ii) **Augmentation of Protocol & Meter Testing Laboratory**

Equipment procurement are in advanced stage. Civil work is being executed by CPWD. The project will be completed by March 2020.

(iii) **Establishment of test facility for (i) Solar Based Grid Tied Inverter Systems (up to 500 kVA) and (ii) Solar PV modules (upto 500 Wp)**

The test facility has been inaugurated by Shri Sanjiv Nandan Sahai, IAS Additional Secretary, MoP in the presence of Shri Vivek Kumar Dewangan, IAS, JS&FA, MoP and Shri Rajpal, IES, EA, MoP on 1st October 2018.

(iv) **Augmentation, Modernisation & Capacity Addition of Battery, Ingress Protection and Illumination test facilities**

All the major items are procured and installed. Civil work is in progress. The project will be completed by March 2020.

II. Augmentation of High Power Short Circuit Test facilities by installation of two Additional 2500 MVA Generators and associated equipment" under XII Plan, (Outlay: Rs. 640.00 Crores)

Project components:

(i) **Augmentation of High Power Short Circuit Test facilities by installation of two additional 2500 MVA Generators with associated equipment at High Power Laboratory, CPRI, Bengaluru**

M/s. CESI, Italy has been appointed as Global Consultant. M/s. CESI, Italy has submitted its two reports. Tender was floated and technical bid was opened for two 2500 MVA SC Generator and now in the technical evaluation process.

(ii) Establishment of 350 MVA Online Short Circuit Test station at UHVRL, CPRI, Hyderabad

M/s. CESI, Italy has been appointed as Global Consultant. M/s. CESI, Italy has submitted its two reports. Tender for establishment of the facility was floated on 18th December 2018 and the same is in technical evaluation process.

(iii) Establishment of Short Circuit Testing Transformers, Excitation Systems for existing Generator

The project is completed.

III. Establishment of New Test Facilities Projects (Outlay: Rs.356.10 Crores)

Project components:

1. Establishment of transmission line tower test station and associated test facilities

Procurement of all equipment with respect to Earthquake Vibration & Research Centre, CPRI, Bengaluru is in advanced stage. Civil work has been handed over to CPWD for Dynamics Laboratory.

UHVRL-CPRI, Hyderabad – Tower Testing Station – The civil work has been handed over to CPWD.

Civil works at Tower Testing Station, UHVRL-CPRI, Hyderabad has been handed over to CPWD.

2. Augmentation of test facilities at STDS-CPRI, Bhopal

Most of the equipment are procured and installed. Major equipment like CT PT System, PD System is in advanced procurement stage. The project shall be completed by March 2020.

3. Augmentation of Pre-Qualification test facilities at CPRI, Bengaluru

Accessories for Impulse Current Generator has been installed and commissioned. Other minor items are in advanced stage of procurement. The project will be completed by March 2020.

4. Establishment and Augmentation of Short Circuit test facilities at CPRI, Bengaluru

All the items to be procured worth Rs.8 Cr. are in advanced stage of procurement. The order for procurement of Transformer worth Rs.1.76 Cr. has been placed. The project will be completed by March 2020.

5. Relocation and Augmentation of Thermal Research Centre –CPRI, Koradi

The registration of land required for the relocation of the Unit at Nagpur has been done in the name of CPRI. Site has been handed over to CPWD and construction of compound wall is completed. Construction of Guest House, Laboratories are in progress.

6. Enhancing Test Facilities of Oil Testing Laboratories and Relocation of RTL, Kolkata.

All the major oil test equipment have been procured and commissioned. The project will be completed by March 2020.

7. Establishment of 40 kA temperature rise test at High Power Laboratory, CPRI, Bengaluru

M/s. CESI, Italy has been appointed as Global Consultant. M/s. CESI, Italy has submitted its reports.

8. (a) Establishment of total test facilities for Transformers at CPRI Western Zone

(b) Setting up of test facilities for Oil testing Lab. at Nashik and

(C) Establishment of test facilities for Energy Meter

The registration of land at Nashik has been done in the name of CPRI. Site has been handed over to CPWD and construction of compound wall is in progress. MSEDCL has furnished the estimate for 220kV line and payment has been made. Shri R K Singh, Union Minister of State (IC) for Power and New & Renewable Energy, Government of India laid the foundation stone of new unit, Regional Testing Laboratory of Central Power Research Institute (CPRI) at Nashik, Maharashtra, on 30th January 2019. Construction of the Laboratory building is in progress.

9. Setting up of Centre of excellence for Non Destructive Testing & Evaluation of power plant components

All the equipment to be procured are in advanced stage of procurement. Most of the equipment are installed. This project will be completed by March 2020.

10. Establishment of Phasor Measurement Unit (PMU) System Testing and Calibration Laboratory

All the items to be procured including software are in advanced stage of procurement. Site has been handed over to CPWD and work is in progress. The project will be completed by March 2020.

11. Smart Grid Research Laboratory

All items to be procured including software are in advanced stage of procurement. Site has been handed over to CPWD and the work is in progress. The project will be completed by March 2020.

- **Shri R K Singh, Union Minister of State (IC) for Power and New & Renewable Energy, Government of India laid the foundation stone of new unit**, Regional Testing Laboratory of Central Power Research Institute (CPRI) at Nashik, Maharashtra, on 30th January 2019. The occasion was graced by Shri Chandrashekhar Krishnarao Bawankule, Minister for Energy, New & Renewable Energy and State Excise, Government of Maharashtra, Shri Hemant Tukaram Godse, Member of Parliament (Lok Sabha), Nashik Constituency and Shri Raj Pal, IES, Economic Adviser, Ministry of Power, New Delhi. Director General-CPRI and other senior officers of CPRI were also present on the occasion.

Laying of foundation stone of new unit, Regional Testing Laboratory of Central Power Research Institute (CPRI) at Nashik, Maharashtra, by Shri R K Singh, Union Minister of State (IC) for Power and New & Renewable Energy, Government of India

Inauguration of -SPV Module Test Facility at ERED - CPRI, Bengaluru

Facility for SPV Module Testing has been established in Energy Efficiency and Renewable Energy Division (ERED), CPRI, Bengaluru and inaugurated by Shri Sanjiv Nandan Sahai IAS, Additional Secretary, Ministry of Power, Govt. of India, in the presence of Shri Vivek Kumar Dewangan, IAS, JS&FA, MoP and Shri Rajpal, IES, EA, MoP, on 1st October 2018.

Some photographs are placed below:

Demonstration of Mechanical Load Impact Test on SPV module

Inauguration of Grid Tied Inverter Test Facility at ERED - CPRI, Bengaluru

Facility for inverter testing has been established in Energy Efficiency and Renewable Energy Division (ERED), CPRI, Bengaluru and inaugurated by Shri Sanjiv Nandan Sahai IAS, Additional Secretary, Ministry of Power, Govt. of India, in the presence of Shri Vivek Kumar Dewangan, IAS, JS&FA, MoP and Shri Raj Pal, IES, EA, MoP, on 1st October, 2018. The Division can now undertake all testing which are mandatory for inverter manufacturer for registration under Bureau of Indian Standards (BIS). With the establishment of this facility, testing on solar power conditioners of rating up to 500 kVA can be performed.

Grid tied inverter test facility

Inauguration of LED Lighting Test Facility at ERED - CPRI, Bengaluru

LED lighting test facility of Energy Efficiency and Renewable Energy Division, CPRI, Bengaluru was inaugurated by Shri Ajay Kumar Bhalla, IAS, Secretary, Ministry of Power, Govt. of India, in the presence of Shri Sanjiv Nandan Sahai IAS, Additional Secretary, MoP, Govt. of India, Shri Vivek Kumar Dewangan, IAS, JS&FA, MoP, Shri Raj Pal, IES, EA, MoP, and Shri Abhay Bakre, Director General, Bureau of Energy Efficiency (BEE) on 27th November 2018. The facility is funded by BEE, MoP, GoI.

Inauguration of LED lighting test facility of Energy Efficiency and Renewable Energy Division at CPRI, Bengaluru by Shri Ajay Kumar Bhalla, IAS, Secretary, MoP & Director General-CPRI, on 27th November 2018

Demonstration of a LED luminaire sample at Goniophotometer test facility by Mr. Sudhir Kumar, Joint Director, CPRI, Bengaluru to Shri Ajay Kumar Bhalla, IAS, Secretary, MoP along with Shri I S Jha, Chairman & Managing Director, Powergrid, Director General-CPRI & Mr. Abhay Bakre, Director General, Bureau of Energy Efficiency.
This facility is funded by Bureau of Energy Efficiency [BEE], MoP

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SECTION-8

ADMINISTRATIVE MATTERS

ADMINISTRATIVE MATTERS

Governance

The following distinguished persons have joined the Governing Council and the Society of CPRI as members in 2018-19:

1) Shri Prakash S Mhaske, Chairperson (I/c.), Central Electricity Authority has assumed charge as Vice-President, Governing Council of CPRI vice Shri Ravindra Kumar Verma

2) Shri Sanjiv Nandan Sahai, IAS, Additional Secretary, Ministry of Power has assumed charge as Member, Governing Council of CPRI vice Smt. Shalini Prasad, IAS

3) Shri Sandesh Kumar Sharma, Member (Planning), Central Electricity Authority has become the Member of CPRI Governing Council vice Shri Pankaj Batra.

4) Dr. Shekhar C Mande, Secretary, DSIR, Ministry of Science & Technology has become the Member of CPRI Governing Council vice Dr. Girish Sahni

5) Shri Anand Kumar, IAS, Secretary, Ministry of New & Renewable Energy has become the member of CPRI Governing Council vice Shri S.K. Singh.

6) Shri Harish Agarwal, President-IEEMA has become the member of CPRI Governing Council vice Shri Gopal Kabra

7) Shri Pratyaya Amrit, IAS, Chairman-cum-Managing Director, Bihar State Power Holding Company Ltd., Patna, Prof. Dr. Bhim Singh, Department of Electrical Engg., Indian Institute of Technology, New Delhi, Prof. Dr. V. Jagadeesh Kumar, Department of Electrical Engg., Indian Institute of Technology, Chennai & Prof. Gautam Biswas, FNA, Director, Indian Institute of Technology, Guwahati have become the members of CPRI Governing Council

The following distinguished persons joined the Standing Committee of CPRI as Members in 2018-19:

1) Shri Sanjiv Nandan Sahai, IAS, Additional Secretary, Ministry of Power has assumed charge as Chairman of Standing Committee, CPRI

During the course of the year, the 81st Standing Committee meeting was held at CPRI, Bengaluru, on 16th July 2018, 82nd Standing Committee meeting was held at CPRI, Bengaluru on 1st October 2018 and 83rd Governing Council meeting and 41st Annual General Meeting was held at CPRI, Bengaluru on 27th November 2018 to consider various issues pertaining to the Institute.

Important Events

- Director General-CPRI attended the 52nd meeting of Board of Directors of NHPTL, held at NHPTL, New Delhi, on 19th December 2018.
- **On-the-spot study visit of Parliamentary Standing Committee on Energy** consisting of Dr. Kambhampati Haribabu-Chairperson and Hon'ble Members from Lok Sabha & Rajya Sabha on the subject of 'Contribution of CPRI in Development of Power Sector', was held at CPRI, Bengaluru, on 23rd January 2019.
- **Meeting of Technical Committee of Research**

  a) The 5th Meeting of Technical Committee on Hydro Research of CPRI was held at CPRI, Bengaluru, on 26th June 2018. The meeting was chaired by Dr. B K Gandhi, Professor, IIT, Roorkee. Members from CEA, NHPC, SJVNL participated in the meeting. Progress of ongoing, completed and evaluation of new projects were presented.

b) The 5th Meeting of Technical Committee on Transmission Research of CPRI was held at CPRI, Bengaluru, on 9th & 10th July 2018. The meeting was chaired by Dr. S C Srivastava, Professor, IIT, Kanpur. Members from CEA, BHEL, POWERGRID and IEEMA participated in the meeting. Progress of ongoing and completed projects were reviewed. Evaluation of new projects was carried out.

c) The 5th Meeting of Technical Committee on Thermal Research of CPRI was held at CPRI, Bengaluru, on 12th July 2018. The meeting was chaired by Dr. R P Vedula, Professor, IITB, Mumbai. Members from CEA, BHEL, TATA POWER, NTPC-NETRA participated in the meeting. Progress of ongoing and completed projects were reviewed. Evaluation of new projects was carried out.

d) The 6th Meeting of Technical Committee on Grid, Distribution and Energy Conservation Research of CPRI was held at CPRI, Bengaluru, on 13th & 14th July 2018. The meeting was chaired by Dr. S V Kulkarni, Professor, IITB, Mumbai. Members from CEA, TANGEDCO participated in the meeting. Progress of ongoing and completed projects were reviewed. Evaluation of new projects was carried out.

e) The 20th Meeting of Standing Committee on R&D (SCRD) of CPRI was held at Conference Hall, NRPC Building, New Delhi, on 25th September 2018. The meeting was chaired by Mr. Pankaj Batra, Chairperson, CEA, New Delhi. The meeting was attended by JS&FA, MoP, Members from CEA, BHEL, POWERGRID, NTPC-NETRA, DSIR and NHPC. Progress of ongoing and completed projects were reviewed. Evaluation of four new projects was carried out.

f) The 6th Meeting of Technical Committee on Hydro Research of CPRI was held at CPRI, Bengaluru, on 27th February 2019. The meeting was chaired by Dr. B K Gandhi, Professor, IIT, Roorkee. Members from CEA, NHPC, and SJVNL participated in the meeting. Completed and New projects were evaluated by the Committee. Progress of Ongoing projects was also reviewed.

g) The 6th Meeting of Technical Committee on Transmission Research of CPRI was held at CPRI, Bengaluru, on 5th & 6th March 2019. The meeting was chaired by Dr. S C Srivastava, Professor, IIT, Kanpur. Members from CEA, POWERGRID and IEEMA participated in the meeting. Completed and New projects were evaluated by the Committee. Progress of Ongoing projects was also reviewed.

h) The 7th Meeting of Technical Committee on Grid, Distribution and Energy Conservation Research of CPRI was held at CPRI, Bengaluru, on 14th & 15th March 2019. The meeting was chaired by Dr. S V Kulkarni, Professor, IITB, Mumbai. Members from CEA and TANGEDCO participated in the meeting. Completed and New projects were evaluated by the Committee. Progress of ongoing projects was also reviewed.

i) The 6th Meeting of Technical Committee on Thermal Research of CPRI was held at CPRI, Bengaluru, on 20th March 2019. The meeting was chaired by Dr. R P Vedula, Professor, IITB, Mumbai. Members from CEA, BHEL and TATA Power participated in the meeting. Completed and New projects were evaluated by the Committee. Progress of ongoing projects was also reviewed.

Signing of MoUs

1) 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 2018-19, on 6th November 2018.

2) A Memorandum of Understanding (MoU) was signed between CPRI & M/s. Schneider Electric for testing of electrical equipments, on 20th February 2019, for a period of two years.

Deputation of CPRI officers overseas

The officers of CPRI were deputed to attend various overseas assignments such as Short Circuit Testing Liaison Meetings, Pre-dispatch Inspection for Quality Clearance, Conferences and Training Programmes. **The details of these overseas assignments are provided in Appendix-8.**

Institute Day Celebration

1) The Institute Day Celebration -2019 was celebrated at CPRI, Bengaluru, on 16th January 2019. Prof. M.R.S. Rao, (Padma Shri), Honorary Professor, SERB Distinguished Fellow, Jawaharlal Nehru Centre for Advanced Scientific Research (Deemed University), Bengaluru, the Chief Guest of the function delivered Jawaharlal Nehru Birth Centenary Memorial Lecture on 'Human Genome shaping the future of mankind' on the occasion. Shri V.S. Nandakumar, Director General-CPRI presided over the function. Mylavarapu Subbalakshamma Award was awarded to Smt. Sarita S Dongre, Joint Director, STDS-CPRI, Bhopal being the best Lady Scientific/Engineering Officer for the most significant work done by her during the year 2018. This award is constituted by our former Director General Dr. M. Ramamurthy, for the best lady scientist of the year**.** Shri B.M. Naidu Award for the best research paper of the year based on testing clues/data, was awarded to Dr. T Bhavani Shanker, Joint Director, CPRI, Bengaluru, for the best research Paper titled "Effects of Transformer-oil Temperature on Amplitude and Peak Frequency of Partial Discharge Acoustic Signals", Published in IEEE Transactions on Power Delivery, page nos. 3227 to 3229, Vol. No. 33, Issue No. 6, December 2018 issue. In the evening a Cultural Programme (Bharatha Bahubali & Mahisasura Mardini-Bale) by M/s. Prabhat Kalavidaru, Bengaluru was arranged, which was attended by all employees & their family members.

From left to right (on the dias): Dr. B Nageshwar Rao, Additional Director, CPRI, Bengaluru, Shri V.S. Nandakumar, Director General- CPRI, Prof. M.R.S. Rao, (Padma Shri), Honorary Professor, SERB Distinguished Fellow, JNCASR, Bengaluru and Shri R A Deshpande, Additional Director, CPRI, Bengaluru

Smt. Sarita S Dongre, Joint Director, STDS-CPRI, Bhopal receiving Mylavarapu Subbalakshamma Award from the Chief Guest

Dr. T Bhavani Shanker, Joint Director, CPRI, Bengaluru receiving the Shri B.M. Naidu Award from the Chief Guest

2) UHVRL, CPRI, Hyderabad celebrated "Institute Day" on 16th January 2019. Chief Guest Shri T. Jagath Reddy, Director (Transmission), TSTRANSCO addressed the gathering on the topic "Challenges in HV Transmission lines and Power Scenario" on the occasion.

Institute Day Celebration at UHVRL, CPRI, Hyderabad

3) RTL-CPRI, Noida celebrated Institute Day on 16th January 2019. The Chief Guest of the function was Shri Venkat Shreedhar, C&M, BSES Rajdhani Ltd. All the employees attended the function. A magic show was orgnised by Sumit Kharbanda on the occasion who entertained the audience.

Other events are as follows:

Shri Amit Prakash, Joint Director (OL, MoP) along with Shri Sunil Kumar, Personal Assistant inspected the CPRI, Bengaluru, on 29th November 2018 inorder to assess the status of Hindi Implementation as per the Official Language Policy of the Union. Ms. Bharathi, Joint Secretary, MoP, Govt. of India in her Inspection Report, very well appreciated the status of Hindi Implementation in the Institute and gave some suggestions to comply with. In reply, the Compliance Report was sent to Joint Secretary, Ministry of Power, on 1st January 2019.

Official Language Inspection by
Shri Amit Prakash, Joint Director (OL, MoP)

Activities Related to Women Employees

CPRI has implemented Internal Policy for Prevention, Prohibition and Redressal of Sexual Harassment of Women at Workplace and a circular to this effect is uploaded on the website.

The Women's Cell looks after the following:

- Welfare of the women employees of the organization
- Caters to the issues/ grievances concerning women employees and facilitates redressal of the same
- Management of the Creche in the CPRI Staff Colony and provides necessary guidelines for its smooth functioning

The internal complaints committee of Women's cell investigates (as per CPRI's internal Policy for Prevention, Prohibiton and Redressal of Sexual Harassment of Women at Workplace) reported cases if any in CPRI of commission of acts of sexual harassment of women and submits its report to the disciplinary authority recommending action to be taken against the accused employees.

The Women's Cell also looks into any other complaints by Women employees in workplace. The internal complaints committee consists of five members from CPRI and one external member.

The Women's cell committee comprises of four members with the senior-most member heading the internal complaints committee as well as the Women's cell.

The Crèche at CPRI is housed in CPRI colony, Bengaluru and is open for the kids of employees of the Institute. In the year 2018-19, the existing strength of the kids is twelve and is managed by Women's cell with the support of management of CPRI.

No sexual harassment case was reported during the year 2018-19.

Statement indicating total number of employees in the Institute and number of women employees in each category, as on 31st March 2019

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	20	1	5.00
4	Joint Director	48	7	14.58
5	Chief Administrative Officer (SG)	1	-	-
6	Chief Accounts Officer	1	-	-
7	Scientists/Engg. Officers	123	17	13.82
8	Scientists/Engg. Assistants	27	2	7.41
9	Non-Tech Officers	14	2	14.29
10	Office Staff/Stenographer	94	38	40.43
11	Library staff	2	1	50.00
12	Technicians	74	-	-
13	Technical Attendant/Attendant	72	4	5.56
14	Drivers/Cook-cum-care taker	10	-	-
15	Multi-Tasking Staff	36	5	13.89
	Total	**523**	**77**	**14.72**

Staff strength of the Institute as on 31st March 2019

Sl. No.	Posts	Number of Employees
1	Director General	1
2	Director	0
3	Additional Director	20
4	Joint Director	48
5	Chief Administrative Officer (SG)	1
6	Chief Accounts Officer	1
7	Scientific/Engg. Category	150

Sl. No.	Posts	Number of Employees
8	Technicians	74
9	Administrative & Supporting Staff	156
10	Supporting Technical Staff	72
	Total	**523**

Vigilance Activities

Shri Birendra Kumar, IA &AS is the Chief Vigilance Officer of CPRI since July 2016.

'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 I.T. 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 was observed in CPRI, Bengaluru & its units from 29th October 2018 to 3rd November 2018. "Integrity Pledge" was administered to all the employees of Head Office and Units at 11.00 A.M on 29th October, 2018. Banners on Vigilance Awareness Week were displayed at prominent locations at Head Office and the Units of CPRI. Background of the theme of Vigilance Awareness week -2018 was displayed on the web page of CPRI and hyperlink for Integrity Pledge was provided in CPRI website for e-pledging. The employees of CPRI took e-pledge using the hyperlink provided in the website as per the directives of CVC. Pamphlets on "Vigilance Awareness Week-2018" were distributed among the employees and also circulated on e-office of CPRI. Pamphlets were also displayed on Notice Boards in all Divisions and Sections.

Observance of the "Vigilance Awareness Week" concluded on 2nd November, 2018 (2nd being the last working day of the week) with an invited talk by Shri. E Ramakrishna Phani, Additional General Manager (Vigilance), Helicopter Division, Hindustan Aeronautics Limited, Bengaluru, who was also the Chief Guest. The Chief Guest in his address emphasized vigilance awareness in day to day functioning and shared his knowledge on Purchase and procurement policy of the Government of India and stressed on using vigilance as a preventive mechanism rather than punitive so as to create a positive environment which enables taking decisions. The officers, staff of the Institute attended the function. A compliance report on observance of "Vigilance Awareness Week" at CPRI was submitted to Ministry of Power, New Delhi, on 26th November 2018.

Rotational Transfer Policy of CPRI was implemented and a circular to this effect is uploaded on the website. CPRI has also formulated a policy on Agreed and ODI list and Officials with Doubtful integrity are being reviewed. CPRI has also been furnishing the requisite reports under provision of Probity among Government Servants to Ministry of Power on monthly basis.

Vigilance Cases

There was no vigilance cases during the Financial year 2018-19.

Information on Right to Information Act

CPRI has an organized RTI application response system having one CPIO, one CAPIO and one Appellate Authority, and has been registered under Ministry of Power as well as at RTI website. The RTI Cell functions with Shri R. A Deshpande, Additional Director, CPRI, Bengaluru as Appellate Authority, Shri M. Janardhana, Joint Director, CPRI, Bengaluru as Central Public Information Officer and Mr. G. Kishore Kumar, Engineering Officer Gr.4, CPRI, Bengaluru as Central Assistant Public Information Officer (CAPIO) and Nodal Officer.

CPRI has updated its website with all the details of officers & office as per the guidelines of RTI Act -2005 under section with suomoto disclosure. This website is updated on daily basis.

During the financial year 2018-19, the RTI cell has received 86 number of applications on various subject matters, which are summarized as below:

No. of Applications received	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
86	**66**	**18**	**2**	**3**	**11**

CPRI-RTI cell uploaded the quarterly reports for April-June 2018, July-September 2018, October-December 2018 and January-March 2019 and Annual Report 2017-18 timely on CIC website and CPRI web site.

The RTI Cell has provided the information for all the RTI applications received during the financial year 2018-19 within the time period.

Liaison Officer for SC/ST & PWD Welfare Activities

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

Smt J. Sreedevi, Joint Director and Shri D.Revanna, Joint Director, CPRI, Bengaluru served as Liaison Officers for SC/ST & PWD and OBC respectively during the year 2018-19. Reservation registers and Roster registers were updated for the year 2018-19.

Dr. B.R. Ambedkar's 127th Birth Anniversary was celebrated at CPRI, Bengaluru, on 14th April 2018. A grand official function was organized to commemorate the Birth Anniversary of Dr. B.R. Ambedkar at CPRI, Bengaluru, on 5th September 2018. Shri Hariram.A, Progressive thinker from Alliance University, Anekal was the Chief Guest and the function was presided over by Director General Shri V.S.Nandakumar.

On this august occasion, Management of CPRI distributed the meritorious awards to the children of CPRI employees who topped in 10th and 12th standard in the categories of SC/ST, OBC & General. As part of the 127th celebrations, sweets were distributed to the employees and cultural program was organized. In this connection, a blood donation camp in association with M/s. K C General Hospital, Malleswaram, Bengaluru was also organized on 10th August 2018.

Dr. B.R. Ambedkar's 127th Birth Anniversary celebrations at CPRI, Bengaluru

Management of CPRI distributing the meritorious awards to the children of CPRI employees

Representation of Scheduled Caste, Scheduled Tribe & OBC as on 31st March 2019

Group	Total	SC	ST	OBC	Others
A	**185**	43	19	33	90
B	**142**	31	22	22	67
C	**160**	43	16	41	60
MTS	**36**	16	3	2	15
Group	**Total**	**SC**	**ST**	**OBC**	**Others**
Total	**523**	**133**	**60**	**98**	**232**
Percentage	-	25.43	11.47	18.74	44.36

Representation of Physically Challenged Employees as on 31st March 2019

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	20	-	-
4	Joint Director	48	-	-
5	Chief Administrative Officer (SG)	1	-	-
6	Chief Accounts Officer	1	-	-
7	Scientists/Engg. Officers	123	5	4.07
8	Scientists/Engg. Assistants	27	1	3.70
9	Non-Tech Officers	14	1	7.14
10	Office Staff/Stenographer	94	3	3.19
11	Library staff	2	-	-
12	Technicians	74	-	-
13	Technical Attendant/Attendant	72	5	6.94
14	Drivers/Cook-cum-care taker	10	-	-
15	Multi-Tasking Staff	36	-	-
		523	**15**	**2.87**

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 2018-19, CPRI has redressed several grievance petitions including 23 online grievance petitions both from the staff and general public on matters related to pension, recruitment and promotion policies, 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 31/03/2019	Yet to Assess	At our Office
Local/Internet	1	7	8	6	2	1	0
Pension	0	4	4	3	1	0	0
PMO	1	8	9	8	1	0	0
Total	2	19	21	17	4	1	0

CPRI Library and Information Centre, Bengaluru

CPRI Library and Information Centre is a special library in the field of power engineering and was established in the year 1960. It provides information services to the employees of the organization and the research scholars.

Number of Publications acquired during the year 2018-19:

Total stock is 34,396 and 95 publications were added during the year. Total number of journals subscribed during the year is 18. Out of 18, foreign journals are 06, Indian journals are 12 (all are technical reference publications), Hindi journals are 3, journal on membership are 3 (IIPE, ACCE & CIGRE), 7 newspapers, and 6 General reading magazine.

CPRI Library and Information Centre has subscribed IEC Standards since 2003. During the year 66 standards were downloaded and uploaded in the CD/DVD server. Indian Standards, ASTM complete set 2016 and Electra 1967-2000 are available on Intranet.

Classification scheme and arrangement:

Books were classified according to UDC scheme of classification and arranged according to classification number in the Book Section. Bound volumes were arranged alphabetically in the Bound Volume Section. Standards, Reports, Technical Reports were arranged according to numbers in the Standards Section. Current periodicals are arranged according to subject wise.

Library and Information Centre is completely automated and is using KOHA open-source Library management software with WEB OPAC having unlimited users. All in-house operations are done through the software. Readers can access the library through OPAC, CD/DVD server and Digital Library on their desktops.

New Services:

Library and Information Centre started Article Indexing of IEEE Journals procured during the year. The Library & Information Centre has subscribed the IEEE Digital Library Enterprise Level-1 Membership of 350 downloading of articles during this year. The Library and Information Centre is educating the readers on the use of WEB OPAC, CD/DVD server, Digital Library & Knowledge Management Systems and also providing reprographic services to the users.

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SECTION-9

FINANCE & ACCOUNTS

Finance & Accounts

The Institute has done well in its financial performance during the year 2018-19 and earned revenue of Rs.204.4912 Crores

Revenue earnings during the past five years

Year	Revenue (Amount in Crores)
2018-2019	204.49
2017-2018	191.05
2016-2017	183.85
2015-2016	159.20
2014-2015	167.27

Increased services rendered to the Utilities and Industries are well reflected in the financial performance raising the revenue earnings from Rs.16727.10 lakhs in 2014-2015 to Rs.20449.12 lakhs during the current year. During the year under report, as against the revenue realization of Rs. 20449.12 lakhs, the expenditure on non-plan activities stood at Rs.20116.87 lakhs resulting in a surplus of Rs.332.25 lakhs. For the 30th year in succession, the Institute has not drawn any Non-Plan Grant-in-Aid from the Government of India.

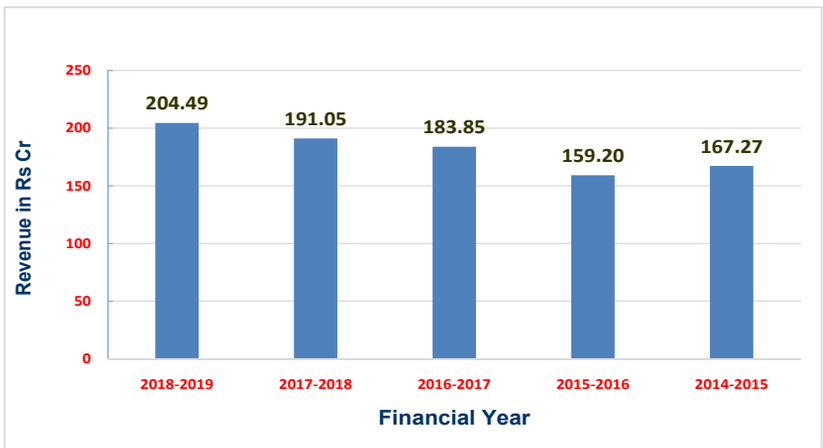
During the year, the expenditure under various heads has been as follows:

Non Plan Expenditure	Rs.20116.87 lakhs
Plan R & D Expenditure	Rs. 397.14 lakhs
Plan Capital Expenditure	Rs. 8188.03 lakhs
RSoP Schemes	Rs. 638.91 lakhs
NPP Schemes	Rs.519.46 lakhs

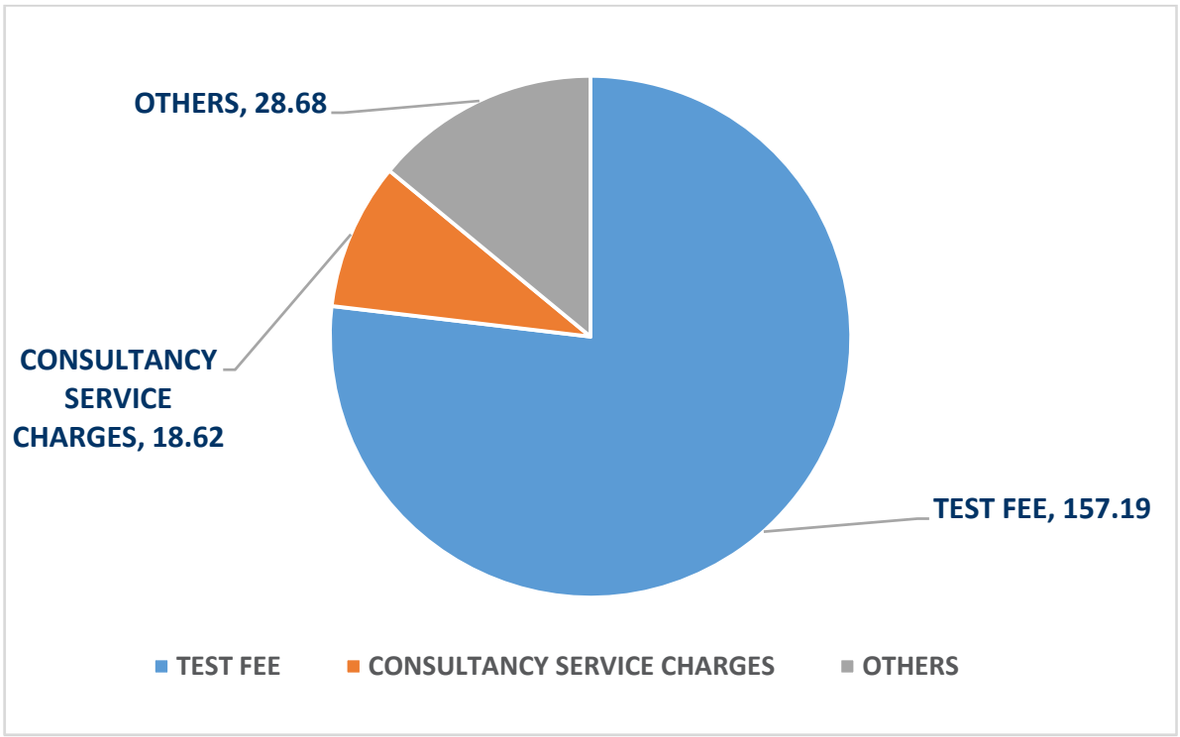
The Institute received grants-in-aid (Plan) of Rs.9434.00 lakhs from the Government of India during the year. **The details along with Auditors Report are furnished in Appendix–11.**

As at the end of March 2019, the capital investment by the Government of India on the Institute has been Rs.97100.00 lakhs.

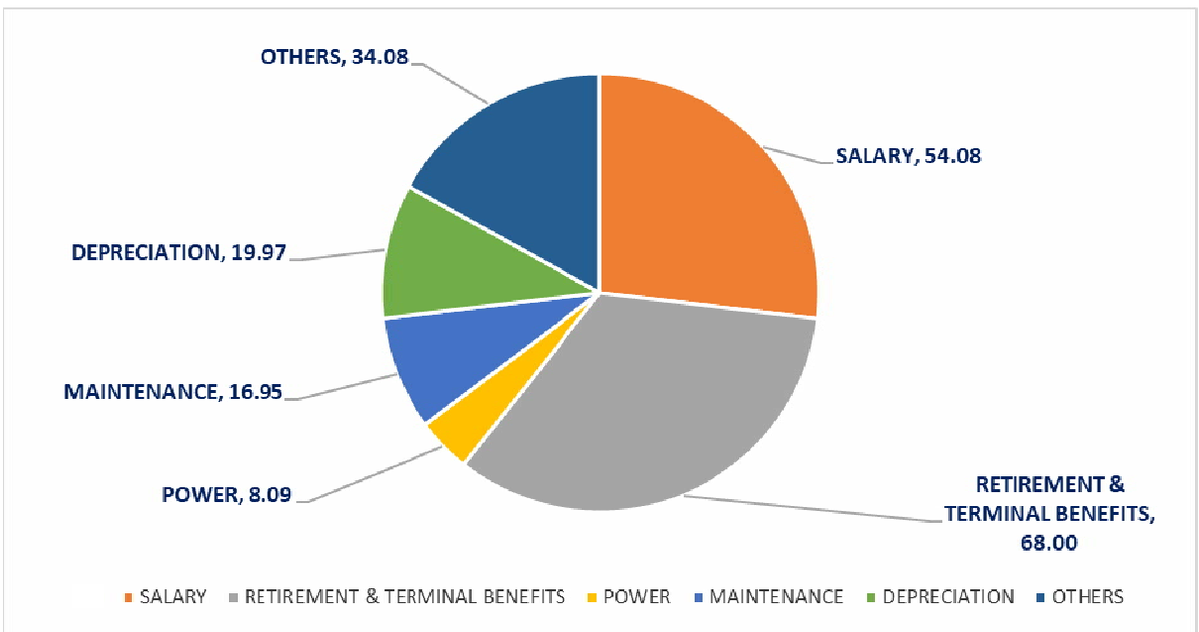
REVENUE EARNINGS DURING THE PAST FIVE YEARS (Rs. in Crores)



REVENUE DURING 2018-19 UNDER MAJOR HEADS (Rs. in Crores)



EXPENDITURE DURING 2018-19 UNDER MAJOR HEADS (Rs. in Crores)



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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 2018 – 19 are listed below:

1. Awards :

TOLIC RAJ BHASHA SHIELD - FIRST :

CPRI, Bengaluru was awarded the prestigious TOLIC RAJ BHASHA SHIELD - FIRST under the TOLIC Shield Scheme for its outstanding performance in the implementation of Progressive use of Official Language during the year 2017-18. The award was received by Shri B. Sridhar, Chief Administrative Officer, CPRI, Bengaluru on 4th January 2019 at the second meeting of TOLIC, held at Bengaluru G.P.O.

Smt. L.N. Vidya, Sr. Hindi Translator, CPRI, Bengaluru was also given a Certificate for her commendable contributions in getting First Prize to CPRI.

Shri B. Sridhar, Chief Administrative Officer, receiving the prestigious TOLIC RAJ BHASHA SHIELD - FIRST

Smt. L.N. Vidya, Sr. Hindi Translator, receiving the Certificate

2. Seminars and Workshops :

A) The Official Language of the Union- A Constitutional perspective :

Hindi workshop on "**The *Official Language of the Union - A Constitutional perspective*"** was organized for the Additional Directors, Joint Directors and all Senior Officers of the Institute, at CPRI, Bengaluru, on 13th April 2018. The faculty for the workshop was Dr. H.S. Rana, Principal Director, Institute of Public Administration, Bengaluru. Around 60 senior level officers participated in the workshop.

Participants in the Hindi workshop on "The *Official Language of the Union – A Constitutional perspective*"

B) Hindi Workshop :

Hindi Workshop on Implementation of the O.L. policy of the Union was organized for the senior officers at CPRI, Bengaluru, on 29th November 2018. The speaker was Shri Amith Prakash, Joint Director (O.L), MoP and he emphasized on the importance of Official Language Policy and the role of language in our day to day affairs.

Hindi Workshop on Implementation of the O.L. policy of the Union

3. Celebration of Hindi Month and Hindi Divas :

Hindi Month was observed from 27th August 2018 to 5th September 2018. Various competitions such as Quiz, Anthakshari, Vocabulary and Spellings, Crossword Puzzle, General Knowledge (Written), Song, Humorous Conversation, Technical Article Completions etc. were organized as a part of the Hindi Month celebration.

Hindi Divas was celebrated at CPRI, Bengaluru, on 27th September 2018. Smt. Jahanzeb Akhtar, Principal Commissioner of Income Tax, Ministry of Finance, Govt. of India was invited as the Chief Guest of the function. Prizes were distributed to the winners of various competitions organized during Hindi month. A cultural programme was presented on this occasion by the In-house talent of CPRI which was appreciated by one and all.

4. Tenders/Publications in Bilingual :

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

B. **Annual Report -** The Annual Report of the Institute for the year 2017-18 is published in bilingual.

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

D. Brochures of Seminar/ Invitation Cards/ Revised purchase formats/ Roving Calendar in Bilingual :

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

5. Rajbhasha Samachar :

The 6th edition of Rajbhasha Samachar which gives a brief report of the remarkable achievements of the Institute in the field of Official Language Implementation during the year 2018 – 19 was brought out.

6. STDS Darpan :

The 20th edition of the In-house magazine of CPRI, Bhopal unit "STDS Darpan" was published.

7. Awards under Incentive Scheme :

A. Noting and Drafting in Hindi

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

B. Annual Technical Article Competition

To promote Hindi writing in Technical field, the Institute is organizing an Annual Technical Article Competition for the past 24 years for the Scientists of all Central Govt. Organizations. The best three articles were awarded prizes on Hindi Divas held at CPRI, Bengaluru, on 27th September 2018.

First Prize	:	Microwave Tube Research and Development Centre, Bengaluru
Second Prize	:	Central Manufacturing Technology Institute, Bengaluru
Third Prize	:	Office of The Principal Director of Commercial Audit & Ex-Officio Member Audit Board, Bengaluru

8. Facilities Provided :

A. Learn 'A Word A Day' Scheme:

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

B. Learn "Ten words a Month" Scheme

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

C. English-Hindi phrases printed on file folders :

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

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

D. Supply of Forms:

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

i. 64 different types of forms of the Institute 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.

9. Web Site :

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

10. TOLIC Activities:

A. CPRI successfully sponsored and organized a Hindi Cross Word Puzzle Competition on 12th October 2018 for the member offices of TOLIC (II). There was an overwhelming response from the participants. Cash Prizes were given to the winners on the occasion of Joint Hindi Divas held at Department of Space, ISRO Headquarters, Bengaluru, on 4th December 2018.

B. Shri M.R. Phalachandra, Sr. Personal Assistant, CPRI, Bengaluru won Consolation prize in written Quiz competition.

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SECTION-II

APPENDIX - I-II

Appendix – 1

The Members of Standing Committee as on 31st March 2019

Sl. No.	Present Incumbent/Nominee	Status
1	Shri Sanjiv Nandan Sahai, IAS Additional Secretary Ministry of Power Shram Shakti Bhawan Rafi Marg New Delhi – 110 001	Chairman
2	Shri Prakash. S. Mhaske Chairperson I/c./Member (Power Systems) Central Electricity Authority Sewa Bhawan R. K. Puram, New Delhi – 110 066	Member
3	Shri Vivek Kumar Dewangan, IAS Joint Secretary & FA Ministry of Power Shram Shakti Bhawan Rafi Marg New Delhi – 110 001	Member
4	Shri Raj Pal, IES 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 Bengaluru–560 080	Member- Convener

Appendix – 2

THE MEMBERS OF COMMITTEE ON TESTING & CERTIFICATION AS ON 31ST MARCH 2019

CHAIRPERSON

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

MEMBERS

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

Appendix – 3

The Members of Standing Committee on Research & Development (SCRD) as on 31st March 2019

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

Appendix – 3

Sl. No.	SCRD - Main Committee	Name & Address	Position
9	DSIR-Scientist-G & above	Shri Ashwani Gupta Scientist 'G', Department of Scientific and Industrial Research New Delhi – 110 016	Member
10	DIPP-IPR Expert	Ms. Palka Sahni Deputy Secretary Dept. of Industrial Policy & Promotion (DIPP) Ministry of Commerce & Industry, Udyog Bhavan New Delhi – 110 011	Member
11	CEA	Smt. Seema Saxena Chief Engineer (R&D) Central Electricity Authority, 3rd Floor, Sewa Bhawan 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, Bengaluru – 560 080	**Convener**
	Special Invitee		
13	BHEL	Director (Incharge of R&D), BHEL, New Delhi	Member
14	POWERGRID	Director (Incharge of R&D) Power Grid Corporation of India Ltd. 'Saudamini', Plot No. 2, Sector 29, Gurgaon– 122 001, Haryana	Member
15	NTPC	Executive Director, NTPC (NETRA) E3 ECOTECH-II, Udhyog Vihar, Gautam Budh Nagar – 201 306 (Uttar Pradesh)	Member
16	NHPC	Director (Incharge of R&D), NHPC NHPC Office Complex Sector-33, Faridabad – 121 003	Member
17	MNRE	Dr. P C Maithani Scientist- G Ministry of New and Renewable Energy, Block 14, CGO Complex, Lodhi Road, New Delhi – 110 003	Member

Appendix – 4

The Members of Technical Committee on Thermal Research as on 31st March 2019

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

Appendix – 5

The Members of Technical Committee on Hydro Research as on 31st March 2019

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

Appendix – 6

The Members of Technical Committee on Transmission Research as on 31st March 2019

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

Appendix – 7

The Members of Technical Committee on Grid, Distribution & Energy Conservation Research as on 31st March 2019

Sl. No.	Affiliation	Position	Name
1	Prof. S.V. Kulkarni, Professor IIT - Mumbai	Chairman	Prof. S. V. Kulkarni, FNAE Professor Department of Electrical Engineering IIT- Bombay, Powai, Mumbai – 400 076
2	Representative from BEE	Member	Dr. Ashok Kumar Energy Economist Bureau of Energy Efficiency 4th Floor, Sewa Bhawan R.K. Puram, New Delhi – 110 066
3	Chief Engineer (DP&D),CEA	Member	Chief Engineer (DP&D) Central Electricity Authority, R K Puram, Sector -1, 7th Floor, Sewa Bhavan New Delhi – 110 066
4	Representative from MNRE	Member	Dr. P. C. Maithani Director 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	Dr. Mustafa Wajid Managing Director MHM Holdings Private Limited #52/1, Basappa Road Shanthinagar, Bengaluru – 560 027
7	Representative of CPRI	Member	Shri Sudhir Kumar R Joint Director, ERED, CPRI, Bengaluru
		Member	Shri Jyotibasu S Joint Director, ERED, CPRI, Bengaluru
		Member	Dr. Amit Jain Joint Director, PSD, CPRI, Bengaluru
8	Chief Engineer-R&D / Director-R&D, CEA	Permanent invitee	Chief Engineer (R&D) CEA, New Delhi
9	CPRI	Member Convener	Head R&D Management Division, CPRI, Bengaluru

Appendix – 8

Personnel deputed abroad for Meeting / Conference / Pre-dispatch Inspection of equipment during the year 2018-19

Sl. No.	Name & Designation of the officer Shri/Smt./Kum.	Purpose of Visit	Country	Duration
1.	Ramachandrappa V Additional Director CPRI, Bengaluru	Attended Pre-Dispatch Inspection of Permanent Magnet Generator & Dynamo Techanctics at the works of M/s. EMG, Electro Machines Company.	Saint Martin, France	23rd & 24th April, 2018
2.	V Sreeram Engg. Officer Gr 2 CPRI, Bengaluru	Third party witnessing of test on 45mvh, 132 kV/33kV at the works of M/s. Malaysia Transformer (S) Bhd.	Kuala Pumpur, Malaysia	5th to 18th April, 2018
3.	V S Nandakumar Director General-CPRI M K Wadhwani Additional Director STDS-CPRI, Bhopal	For participating in the 44th STL Management Committee meeting at KEMA Laboratories	Prague, The Czech Republic	14th to 17th May, 2018
4.	Dr. B. Nageshwar Rao Additional Director CPRI, Bengaluru	For participating and presenting technical paper in the 12th International Conference on 'Properties and Applications of Dielectric Materials -ICPADM 2018'	Xian, China	20th to 24th May, 2018
5.	R Sudhir Kumar Joint Director CPRI, Bengaluru S. Jothibasu Joint Director CPRI, Bengaluru N Rajkumar Joint Director CPRI, Bengaluru	For conducting training programme at Hwange Power Station, for Zimbabwe Power Company Officers	Zimbabwe	20th May to 16th June, 2018
6.	Dr. V Saravanan Joint Director CPRI, Bengaluru	For conducting training programme at Hwange Power Station, Zimbabwe Power Company	Zimbabwe	27th May to 9th June, 2018
7.	B A Sawale Additional Director STDS-CPRI, Bhopal	For attending IEC TC-13 and WG11 Meeting	RIGI, Switzerland	23rd to 25th May, 2018

Appendix – 8

Sl. No.	Name & Designation of the officer Shri/Smt./Kum.	Purpose of Visit	Country	Duration
8.	Dr. P Thomas Additional Director CPRI, Bengaluru	For attending & presenting technical paper at 2nd International Conference in Dielectrics (IEEE ICD -2018)	Budapest Hungary	3rd to 5th July, 2018
9.	Arun Kumar S Engg. Officer Gr 3 CPRI, Bengaluru	Third party witnessing of test on 1MVA Cast Resin Transformer at the works of M/s. Energypac Engineering Ltd.	Dhaka, Bangladesh	19th July, 2018
10.	A K Khanra Engg. Officer Gr 4 STDS-CPRI, Bhopal	Third party witnessing of test on 28AWA, 33/11.55 kV Power Transformer at the works of M/s. Energypac Engineering Ltd.,	Dhaka, Bangladesh	18th to 21st July, 2018
11.	U R Seshagiri Rao Joint Director CPRI, Bengaluru Y Dharmesh Engg. Officer Gr 3 CPRI, Bengaluru	Pre-Dispatch inspection of 600kV and 1800kV "High Voltage Dividers for outdoor Cascade Transformer at the works of M/s. Shanghai Jiuzhi Electric Co. Ltd.,	Shanghai, China	1st & 2nd August, 2018
12.	Dr. Manohar Singh Engg. Officer Gr 3 CPRI, Bengaluru	For participation & presenting a technical paper at IEEE PES General Meeting-2018	Portland, USA	6th to 9th August, 2018
13.	Govinda Rao G Engg. Officer Gr 3 CPRI, Bengaluru	Third Party witnessing of test on 90 MVA 132 kV/33 kV Transformer at M/s. Malaysia Transformer Manufacturing Ltd.	Kuala Lumpur, Malaysia	12th to 25th September, 2018
14.	B M Mehra Additional Director STDS-CPRI, Bhopal Ramadas Engg. Officer Gr 2 CPRI, Bengaluru	For participation and manning the CPRI Stall in the "POWER EX ASIA 2018" and Electric Asia-2018 Exhibition	Bangkok, Thailand	6th to 8th September, 2018
15.	Sarita S Dongre Joint Director STDS-CPRI, Bhopal	Third party witnessing of Temperature rise test on 28 MVA 33/11.55kV power transformer at M/s. Energypac Engineering Ltd., Dhaka	Dhaka, Bangladesh	30th September to 3rd October, 2018

Appendix – 8

Sl. No.	Name & Designation of the officer Shri/Smt./Kum.	Purpose of Visit	Country	Duration
16.	Maroti Engg. Officer Gr 3 CPRI, Bengaluru	Witnessing of post SC tests physical inspection of temperature rise at M/s. Energy Pac Ltd.,	Dhaka, Bangladesh	29th October to 7th November, 2018
17.	V S Nandakumar Director General-CPRI Sudhakar Reddy S Additional Director CPRI, Bengaluru	For participation in the 66th STL Technical Committee meeting held in CESI	Milano, Italy	13th & 14th November, 2018
18.	Dr. B. Nageshwar Rao Additional Director CPRI, Bengaluru	For attending 23rd IEC/TC-20 meeting, Working Group-17 & 18 and Plenary Meeting	Shanghai, China	5th to 9th November, 2018
19.	Govinda Rao G Engg. Officer Gr 3 CPRI, Bengaluru	Third party witnessing of type test at M/s. Malaysia Transformer Manufacturing Sdn. Bhd.	Kuala Lumpur, Malaysia	15th to 28th November, 2018
20.	Rajaramamohanrao Chennu Engg. Officer Gr 3 CPRI, Bengaluru	Third party witnessing of test on Power Transformer at M/s. Malaysia Transformer Manufacturing Sdn. Bhd.	Kuala Lumpur, Malaysia	28th December 2018 to 12th January, 2019
21.	Arun Kumar S Engg. Officer Gr 3 CPRI, Bengaluru	Third party witnessing of test on SPEC 307, 90 MVA 132 kV/33 kV Power Transformer at M/s. Malaysia Transformers Manufacturing Sdn. Bhd.	Kuala Lumpur, Malaysia	28th March 2019 to 11th April, 2019
22.	Manoher Singh Takkher, Joint Director STDS-CPRI, Bhopal	To Witness Partial Discharge Measurement of 4000kVA, 33/0.433kV Cast Resin Dry Type Transformer at M/s SGB MY Sdn Bhd, Malaysia	Malaysia	29th March, 2019

Appendix – 9

Membership of CPRI Officers in International / National Committees

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
1.	Dr. B. Nageshwar Rao Additional Director CPRI, Bengaluru	Chairman	BIS ET - 09 Power Cables Committee
		Member	IEC Project team 62985 for DC High voltage cables
			CIGRE India Study Committee for Power Cables
			IEC Technical Committee 20, Working Group 17 & 18
2.	Dr. N. Vasudev Additional Director CPRI, Bengaluru	Chairman	BIS Sectional Committee High Voltage Engineering ETD -19
		Principal Member	BIS Technical Committee for Electrical Insulators & Accessories Sectional Committee ETD- 06
			Electro Technical Standards Sectional Committee ETD -01
		Member	CIGRE National Committee for Overhead Lines
3.	Anupam Awasthi Additional Director CPRI, Bengaluru	Chairman	BIS Sectional Committee on Low Voltage Switchgear and Controlgear, ET-07
4.	Meera K.S Additional Director CPRI, Bengaluru	Principal Member	HVDC Power Systems Sectional Committee, ETD - 40
			Power System Control and Communications Sectional Committee, LITD - 10, its Panels
			LVDC Distribution Systems and Micro Grid Sectional Committee, ETD- 50
5.	J. Santhosh Additional Director & Unit Head, STDS-CPRI, Bhopal	Chairman	BIS, ETD-01 "Basic Electro Technical Standards and Power Quality Sectional Committee"
6.	M.K. Wadhwani Additional Director STDS-CPRI, Bhopal	Chairman	High Voltage Switchgear & Control Gear Sectional Committee ETD-08 of BIS
		Member	BIS Power Transformers Sectional Committee ETD-16
			Fuses Sectional Committee BT- 39

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
7.	B.M. Mehra Additional Director STDS-CPRI, Bhopal	Expert Member	IEC-International Electrotechnical Commission Committee No. IEC TC 38 for Instrument Transformer and representing Bureau of Indian Standards, New Delhi in their two Subcommittees : - IEC TC - 38/MT40: Maintenance Team of IEC 60044-6, Current Transformer for transient performance. - IEC TC38/WG AHG41:Working Group for Power Quality Measurement
		Principal Member	Standing Committee to investigate the failure of equipments at 220kV and above sub-stations
		Member	BIS Sectional Committee- Electrical Insulators and Accessories, ET-06
8.	B.A. Sawale Additional Director STDS-CPRI, Bhopal	Chairman	BIS ET-13
		Member & Convener of Panel	BIS ET-13 P4
		Member	Expert Committee of Energy Metering- CBIP
			IEC TC-13/WG11, WG14, WG15
			State Tariff Advisory Committee for MPSERC, Bhopal
9.	Swaraj Kumar Das Additional Director CPRI, Bengaluru	Member	BIS Sectional Committee, ET -34 & ET- 07
			Technical Committee of BEE Distribution Transformer Standards & Labeling program
10.	Dr. Pradeep M Nirgude Additional Director UHVRL-CPRI, Hyderabad	Principal Member	BIS ET-48 - UHV AC Transmission Systems - Sectional Committee
			BIS-ET-19- High Voltage Engineering Sectional Committee
			BIS ET- 36 – Tools & Equipment for live working -Sectional Committee

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
		Alternate Member	Indian National Committee (IEC)
			Bureau of Indian Standards (BIS) ET-30 - Surge Arresters Sectional Committee
			Basic Electro Technical Standards and Power Quality Sectional Committee ETD – 01
			Working Group WG-1 on Valve Electronics on Indigenous development of HVDC/FACTS Components formed by PGCIL (Powergrid)
		Member	Power & Telecommunication coordination Committee constituted to examine the induction effects of HVDC Transmission lines –Sub-Committee
11.	S. Bhattacharya Additional Director CPRI- RTL, Noida	Member	BIS Committee on Instrument Transformers ET-34
			BIS Committee on Low Voltage Switchgear & Controlgear ET-07
12.	S. Sudhakara Reddy Additional Director CPRI, Bengaluru	Chairman	BIS ETD-16 Transformer Sectional Committee
		Principal Member	BIS ETD-47 - Sectional Committee on Traction Equipment
			BIS ETD-08 -Sectional Committee on HT Switchgear
13.	Dr. P Thomas Additional Director CPRI, Bengaluru	Chairman	ET-03 BIS Technical Committee
14.	D. Revanna Joint Director CPRI, Bengaluru	Principal Member	Panel of experts on manual on Transmission lines, CBI & P, New Delhi
		Alternate Member	"Use of steel in over lead line towers and switch yard structure and masts for telecommunication and flood lighting" -Sub Committee – CED 7:1 of BIS, New Delhi

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
		Member	Standing committee of experts to investigate Cause of failure of towers, Central Electricity Authority (CEA), New Delhi
			Conductors and accessories on Overhead Lines -BIS Committee ET 37, IEC/TC7 & TC11
			Committee for audit of transmission lines tower with respect to design & life of towers, CEA/CEID, New Delhi
15.	Shivakumar V, Joint Director CPRI, Bengaluru	Member	IEC TC-57/WG15 (Security)
			BIS-LITD-10
			ISGF –WG 2: IoT, Smart Metering, AI & Analytics
			ISGF –WG 3: Digital Architecture & Cyber Security
			ISGAN-SIRFN (International Smart Grid Action Network – Smart Grid International Research Facilities Network)
		Member Convener	BIS-LITD-10, Panel -2 (Security)
16.	K. P. Meena Joint Director CPRI, Bengaluru	Principal Member	BIS ET -09 Power Cables Committee
17.	R. Sudhir Kumar Joint Director CPRI, Bengaluru	Principal Member	BIS-Sectional Committee ETD-23 “Electric Lamps and their Auxiliaries”
			BIS-Sectional Committee ETD-28 “Solar Photovoltaic Energy Systems”
		Certified “Energy Auditor and Energy Manager”	Bureau of Energy Efficiency, Ministry of Power, Govt. of India
18.	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
		Member	Certified Internal Auditor of ISO 9001

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
19.	M.D. Anantha Babu Joint Director CPRI, Bengaluru	Principal Member	Conductors and accessories on Overhead Lines -BIS Committee ET- 37, IEC/TC7 & TC11
20.	Dr. M. Selvaraj Joint Director CPRI, Bengaluru	Member	Panel of experts on manual on Transmission Lines - CBI & P, New Delhi
			Standing committee of experts to investigate Cause of failure of towers - Central Electricity Authority (CEA), New Delhi
			Committee for Audit of Transmission lines tower with respect to design & life of towers - CEA / CEID, New Delhi
		Individual Member	SCB2 Overhead Lines, CIGRE, Paris
21.	M. Janardhana Joint Director CPRI, Bengaluru	Alternate Member	ETD-44- Safety of Machinery
22.	Dr. M. Venakteswara Rao Joint Director CPRI, Bengaluru	Member	Standardization of environmental aspects ETD- 23
23.	Dr. V. Saravanan Joint Director CPRI, Bengaluru	Alternate Member	Clay and Stabilised soil products for construction, CED -30
24.	S. Vynatheya Joint Director CPRI, Bengaluru	Alternate Member	MTD-4, BIS Flat Steel Products Subcommittee, MTD 4.3
25.	Dr. Amit Jain Joint Director CPRI, Bengaluru	Principal Member	BIS-LITD10 (Power System Control and Associated Communications Sectional Committee)
		Member	BIS-ET 46 (Grid Integration of Renewables)
			Project Review Committee (PRC-1) for NaMPET Phase-II

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
26.	T. Bhavani Shanker Joint Director CPRI, Bengaluru	Chairman	Sectional Committee on Power Capacitors ET-29 of BIS, New Delhi
		Member	NDT Level I Certified Engineer for Acoustic Emission testing as per American Society for Non-Destructive Testing (NDT).
			WG 14 "Series capacitors for Power systems" under IEC/TC 33
			WG 23 "Shunt capacitors of Self healing type for voltages above 1000V for Power systems" under IEC/TC 33
		Alternate Member	Environmental testing procedures Sectional Committee LITD-01 of BIS
27.	J. Sreedevi Joint Director CPRI, Bengaluru	Principal Member	BIS - Wind Turbines Sectional Committee ETD -42
			CIGRE Study Committee B4.72, DC Grid Benchmark Models for System Studies
		Alternate Member	HVDC Power Systems Sectional Committee, ETD - 40
28.	G Pandian Joint Director CPRI, Bengaluru	Technical	BIS Sectional Committee on Tools and Equipment for live working, ETD-36
29.	P Kaliappan Joint Director CPRI, Bengaluru	Principal Member	BIS ETD 35 Power Systems Relaying Committee
		Secretary	Panel 4 of LITD 10 PMU panel for PMU Testing and Certification
30.	G.R. Viswanath Joint Director RTL-CPRI, Noida	Member	BIS Technical Committee ET- 03 on Electro Technical Fluids
31.	Manoher Singh Takkher Joint Director STDS-CPRI, Bhopal	Member	High Voltage Switchgear & Control Gear Sectional Committee ETD-08 of BIS
32.	Sumbul Munshi Joint Director STDS-CPRI, Bhopal	Member	BIS Committee on Low Voltage Switchgear & Controlgear ET- 07

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
33.	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 Photovoltaic 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
34.	Yugal Agrawal, Joint Director STDS-CPRI, Bhopal	Member	BIS Sectional Committee ETD 47, Electrical Traction Equipments
35.	G. Girija Joint Director CPRI, Bengaluru	Member	BIS Sectional Committee for Environmental Conditions Testing Procedures – LITD- 01
36	Dr. S.K. Nath Joint Director TRC-CPRI, Koradi	Alternate Member	Technical Committee on Thermal Research of Standing Committee on R&D (SCRD) of Min. of Power, Govt. of India
37.	K.A. Aravind Joint Director UHVRL-CPRI, Hyderabad	Alternate Member	BIS ETD-19 - High Voltage Engineering
38.	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
39.	Pradish M Engg. Officer Gr.4 CPRI, Bengaluru	Member	BIS ETD-13
			BIS ETD-13, Panel 1 & Panel 4
			BIS LITD-10, Panel 1, 2 & 3
			ISGF WG 3: Digital Architecture & Cyber Security
			ISGF-WG-2: IoT Smart Metering, AI & Analytics
40.	Dr. Kuldeep Singh Rana Scientific Officer Gr.3 CPRI, Bengaluru	Principal Member	BIS ETD- 10 & 11 for Primary, Secondary Cell and Batteries
		Member	Electro technology in Mobility Sectional Committee, BIS ETD-51
41.	Dharmesh Yelamanchi Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	Sectional Committee, ET -06, BIS
			Sectional Committee, ET -19, BIS
42.	Dr. Manohar Singh, Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	BIS - Wind Turbines Sectional Committee ETD-42
			ETD 35 Power Systems Relaying Committee

Appendix – 9

Sl. No.	Name & Designation Shri/Smt./Kum.	Member	Name of the Committee
43.	Thirumurthy Engg. Officer Gr.3 CPRI, Bengaluru	Alternate Member	BIS ET -09 Power Cables Committee
44.	V. Vaidhyanathan Engg. Officer Gr.3 CPRI, Bengaluru	Principal Member	Power Capacitors Sectional Committee ET -29 of BIS
		Member	MT-21 "Shunt capacitors for voltages upto 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
45.	Shaileshwari M U, Engg. Officer Gr.3 CPRI, Bengaluru	Member	ISGF WG 3: Digital Architecture & Cyber Security
			BIS LITD-10, Panel- 2 on security
46.	D. Venkatesh Engg. Officer Gr.3 CPRI, Bengaluru	Principal Member	BIS ETD-32 Committee for Electrical Appliances
47.	Mridula Jain Engg. Officer Gr.2 RTL-CPRI, Noida	Member	CIM Working Group under LITD-10 under BIS
48.	Jithin Pauly P Engg. Officer Gr.2 CPRI, Bengaluru	Alternate Member	Sectional Committee BIS ETD-30
			Sectional Committee, ETD-48, BIS
49.	Ashitha P N Engg. Officer Gr. 1 CPRI, Bengaluru	Principal Member	BIS ETD-02, Solid Electrical Insulating Materials and Insulation Systems Sectional Committee

Appendix – 10

Papers presented / published indicating Event / Venue / Journal for 2018-19

Capacitors Division

1. T. Bhavani Shanker, H N Nagamani, Deepthi Antony- Student Member-IEEE & Gururaj S. Punekar- Senior Member- IEEE, titled "Effects of Transformer-Oil Temperature on Amplitude and Peak Frequency of Partial Discharge Acoustic Signals", in IEEE transactions on Power Delivery – Journal of December 2018, Page Nos.3227-3229, Vol.33, No.6.

2. T. Bhavani Shanker, V. Vaidhyanathan & A. Sheik Mohamed, titled "Comparison of Partial Discharge Performance of Identical Generator Transformers in a Thermal Power Station by Acoustic Emission Technique –Case Studies", at International Conference on High Voltage Engineering and Technology (ICHVET)-2019, organized by IEEE-Hyderabad at Hotel Manohar, Hyderabad, on 7th & 8th February 2019.

3. T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam & A. Sheik Mohamed, titled "Performance Evaluation of Shunt Power Capacitors at Higher and Lower Ambient Temperatures using Standard Test Protocols", at International Conference on Capacitors – CAPACIT-2019, organized by IEEMA-New Delhi, at Hotel Lalit, New Delhi, on 14th & 15th February 2019.

4. T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam & A. Sheik Mohamed, titled "An Analysis of Thermal Behaviour of Components Integrated in Large Capacity LV APFC panel in loaded conditions", at International Conference on Capacitors – CAPACIT-2019, organized by IEEMA-New Delhi, at Hotel Lalit, New Delhi, on 14th & 15th February 2019.

5. T. Bhavani Shanker, V. Vaidhyanathan, R. Shyam & A. Sheik Mohamed, titled "Importance of Periodic Diagnosis & Condition Assessment of High Voltage Switchgear & Control gear in Capital Asset Management", at National Conference on "Switchgear and Control gear", organized by High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

6. V. Vaidhyanathan & T. Bhavani Shanker, titled "CPRI Experiences in Diagnosis and Condition Monitoring of EHV Circuit Breakers", at National Conference on "RLA of Hydropower plants", organized by Materials Technology Division, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

7. T. Bhavani Shanker, V. Vaidhyanathan & A. Sheik Mohamed, titled "Condition Assessment of Generator Transformers in Hydro Power Station for Partial Discharges by On-line Acoustic Emission Technique", at National Conference on "RLA of Hydropower plants", organized by Materials Technology Division, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

8. V. Vaidhyanathan & Dillip Kumar Puhan, titled "Diagnosis and Condition Monitoring of Large Capacity Power Generators at Site", at National Seminar on "Energy Efficiency in Power Generation", organized by ERED, CPRI, Bengaluru, at CPRI, Bengaluru, on 21st & 22nd February 2019

Appendix – 10

Cables & Diagnostics Division

9. B. Nageshwar Rao, S. Vynatheya, R. Kandiban, titled "Characterization of LDPE-Metal oxide Nanocomposites using Thermo-Analytical and Spectroscopic Techniques", at 2nd International Conference on Dielectrics ICD- 2018, held at Budapest, Hungary, from 1st to 5th July 2018.

10. B. Nageshwar Rao, titled "Ageing Indicators of stator winding Insulation subjected to Elevated Frequency Voltage & Thermal Stresses", at 2nd International Conference on Dielectrics ICD- 2018, held at Budapest, Hungary, from 1st to 5th July 2018.

11. B. Nageshwar Rao, Anju R. K, Ashwin Parthasarathy, titled "Thermal Characterization of Polyethylene-metal oxide nanocomposites used as electrical insulation in HVDC Cables", at IEEE 12th International Conference on Properties and Application of Dielectric Materials (ICPADM 2018), held at Xian, China, from 20th to 24th May 2018.

12. Manas Ranjan Patra, B. Nageshwar Rao, titled "Effect of moisture and geometrical parameter on dielectric behavior of ester oil impregnated insulation using dielectric spectroscopy measurement", at IEEE 12th International Conference on Properties and Application of Dielectric Materials (ICPADM 2018), held at Xian, China, from 20th to 24th May 2018.

13. Ramesh P Nair, B. Nageshwar Rao, Thirumurthy B.V., Sumangala, titled "Effect of Temperature on Slot Discharge pattern measured in stator coils at variable Frequency sinusoidal voltage excitation", at IEEE 12th International Conference on Properties and Application of Dielectric Materials (ICPADM 2018), held at Xian, China, from 20th to 24th May 2018.

14. R. Arunjothi, P. V. Satheesh Kumar, Thirumurthy, G.K. Raja, K.P. Meena, titled "Assessment of properties of insulation materials of house wiring cables", at 8th International Conference on Cables and Wires CABLEWIRE 2018, organised by IEEMA, held at New Delhi, on 23rd & 24th August 2018.

15. Thirumurthy, R. Arunjothi, K.P. Meena, titled "Screened separable connectors for compact cable Terminations of distribution networks- Evaluation criteria & failure modes", at 8th International Conference on Cables and Wires CABLEWIRE 2018, organised by IEEMA, held at New Delhi, on 23rd & 24th August 2018.

16. Dillip Kumar Puhan, Rajat Sharma, titled "Condition Assessment Techniques for insulation diagnosis of oil filled power transformers", at Seminar on "Transformer Technologies, best design practices, Standards and Testing Techniques", held at CPRI, Bengaluru, on 26th October, 2018.

17. K.P. Meena , titled "Significance of Partial Discharge Measurement on Dry Type Transformer", at Seminar on "Transformer Technologies, best design practices, Standards and Testing Techniques", held at CPRI, Bengaluru, on 26th October, 2018.

18. B. Nageshwar Rao, Nandakumar V.S, Anju R.K., Ashwin Parthasarathy C, Kandiban R, titled "HVDC Cable : LDPE Nano dielectric and its response to low frequencies", at IEEE International Conference on High Voltage Engineering and Technology (ICHVET), held at The Monohar, Begumpet, Hyderabad, organized by IEEE, Hyderabad, on 7th & 8th February 2019.

Appendix – 10

19. B.Nageshwar Rao, Ramesh P Nair, titled "Stator Winding Insulation Diagnosis by Very low Frequency Techniques", at IEEE International Conference on Diagnostics in Electrical Engineering (Diagnostica 2018), held at Pilsen Czech Republic, from 4th to 7th September 2018.

20. B.Nageshwar Rao, titled "Case Studies of Rotating Machine Insulation Condition Assessment", at IEEE International Conference on Diagnostics in Electrical Engineering (Diagnostica 2018), held at Pilsen Czech Republic, from 4th to 7th September 2018.

21. B.Nageshwar Rao, K.P.Meena, titled "High Voltage Direct Current Extruded Cable – An Overview", at 10th International Conference on Power Cables CABLETECH-2019, held at CPRI, Bengaluru, on 27th& 28th February 2019.

22. B.Nageshwar Rao, Dillip Kumar Puhan, Rajat Sharma, titled "Dielectric Diagnosis of Extruded Cable Insulation by very low frequency and spectroscopic Techniques", at 10th International Conference on Power Cables CABLETECH-2019, held at CPRI, Bengaluru, on 27th & 28th February 2019.

23. R.Arunjothi, Thirumurthy, P.V.Satheesh Kumar, G.K. Raja, K.P.Meena, titled "Flame Retardancy of Instrumentation and Control Cables – CPRI's Experience", at 10th International Conference on Power Cables CABLETECH-2019, held at CPRI, Bengaluru, on 27th & 28th February 2019.

Dielectric Materials Division

24. P. Thomas & Nandini.E.Hudedmani, titled "The effect of $Ba_{0.85}Ca_{0.15}Zr_{0.1}Ti_{0.9}O_3$ (BCZT) nanoparticles on the critical parameters of synthetic ester based nanofluids", at ICD 2018, 2nd International Conference on Dielectrics, held at Hungary, from 1st to 5th July 2018.

25. A. Ashokbabu & P. Thomas, titled "Structural, Thermal and Dielectric Behaviour of Polyaryletherketone (PAEK)/$CaCu_3Ti_4O_{12}$ (CCTO) Nanocomposite Films", at International Conference on Advanced Ceramics and Nanomaterials for Sustainable Development (ACeND 2018), held at Christ University (Deemed to be University), Bengaluru, from 19th to 21st September, 2018.

26. Nandini.E.Hudedmani & P. Thomas, titled "Dielectric and thermal conductivity behavior of mineral oil based nanofluids", at International Conference on Advanced Ceramics and Nanomaterials for Sustainable Development (ACeND 2018), held at Christ University (Deemed to be University), Bengaluru , from 19th to 21st September, 2018.

27. M.Padmini, P.Elumalai & P. Thomas titled "Symmetric Supercapacitor performance of $CaCu_3Ti_4O_{12}$ decorated polyaniline nanocomposite", at Electrochemicia Acta, Vol. No. 292 (2018), pg.558-567.

28. M.Padmini & P.Thomas, titled "High performance of Polypyrrole –$CaCu_3Ti_4O_{12}$ nano composites for supercapacitor application", at International Meeting on Energy Storage Devices (IMSED 2018), held at IIT, Roorkee, from 10th to 12th December 2018.

Appendix – 10

29. Ann Pamla Cruze & Lokesh Kaggare, titled "Effect of Esterification and Alkali Neutralization on Pongamia Insulating Oil", at 15th IEEE India Council International Conference (INDICON2018), held at Amrita Vishwa Vidyapeetham, Coimbatore, from 16th to 18th December 2018.

30. A. Ashokbabu & Dr. P. Thomas, titled "Preparation and Characterization of Nylon 11/ $CaCu_3Ti_40_{12}$ (CCTO) Nanocomposites", at 15th IEEE India Council International Conference (INDICON2018), held at Amrita Vishwa Vidyapeetham, Coimbatore, from 16th to 18th December 2018.

31. A. Ashokbabu & P. Thomas, titled "Dielectric & Thermal Properties of PTFE/$CaCu_3Ti_4O_{12}$ (CCTO) Nanocomposites", at International Conference on High Voltage Engineering and Technology (ICHVET-2019), organized by, IEEE-Hyderabad, at Hyderabad, on 7 & 8th February 2019.

32. Ann Pamla Cruze & K.S. Lokesh Kaggare, titled "Ageing characteristics of Alkali Neutralized on Neem oil for liquid insulation", at International Conference on High Voltage Engineering and Technology (ICHVET-2019), organized by IEEE-Hyderabad, at Hyderabad, on 7th & 8th February 2019.

33. P. Thomas & Nandini E Hudedmani, titled "The Effect of Nanoparticles on the Insulating Characteristics of Synthetic Esters", at International Conference on High Voltage Engineering and Technology (ICHVET-2019), organized by IEEE- Hyderabad, at Hyderabad, on 7th & 8th February 2019.

34. R S Ernest Ravindran, P Thomas & S Renganathan, titled "Effect on dielectric, structural and thermal behaviour of CaCu3Ti4O12 in a Nylon 11 matrix ", in Bull. Mater. Sci. (2019) 42:28, 01 February 2019.

35. P. Thomas & Nandini E. Hudedmani, titled "Synthetic Ester Oil Based High Permittivity CaCu3Ti4O12 (CCTO) Nanofluids an Alternative Insulating Medium for Power Transformer", in *IEEE Transactions on Dielectrics and Electrical Insulation, Vol. No.26, Issue No. 1, February 2019.*

36. P Sadasivamurthy, titled "Characterization of Ester based oils as alternative to Mineral insulating oils", at Workshop on Performance evaluation and acceptance criteria of liquid di-electrics for use in power transformers as per national and international test norms, held at STDS, CPRI, Bhopal, on 28th September 2018.

37. Sadasivamurthy, titled "Management Service for the Treatment of Transformer Mineral containing PCB's Mobile De-chlorination System", Performance evaluation and acceptance criteria of liquid di-electrics for use in power transformers as per national and international test norms held at STDS, CPRI, Bhopal, on 28th September 2018.

Electrical Appliances Technology Division

38. Kuldeep Rana, Shivangi Kosta, R Sneha, titled "Fabrication and Electrochemical Performance of Low Cost Soluble Lead Redox Flow Battery using two different Carbon Electrode", at International Meeting on Energy Storage Devices-2018, held at IIT, Roorkee, on 11th December 2018.

Appendix – 10

39. Kuldeep Rana, R Sneha and Shivangi Kosta, titled "Nickel based additive-free ultrathin graphite film for fabrication of flexible symmetric supercapacitor" at International Conference on Supercapacitors and Energy Storage Applications, ICSEA-2019, held at CMET, Thrissur, on 10th March 2019.

40. Seong Dae Kim, Jong-Gun Lee, Tae-Gun Kim, Kuldeep Rana, Jong-Hyun Ahn, titled "Additive-free electrode fabrication with reduced graphene oxide using supersonic kinetic spray for flexible lithium-ion batteries", in Carbon Journal, Vol. No. 139, page No. 195-204, November – 2018.

41. Kuldeep Rana, R. Sneha, Shivangi Kosta , titled "Design Fabrication and electrochemical performance of soluble lead redox flow battery for energy storage", at National Power Systems Conference-2018, held at NIT, Trichy, on 15th December 2018.

Energy Efficiency & Renewable Energy Division

42. R. Sudhir Kumar, K. Jeykishan Kumar, Jay Johnson, Alexandre Prieur, Nayeem Ninad, Estefan Apablaza-Arancibia, Roland Bründlinger, Changhee Cho, Jun Hashimoto, Maurizio Verga, Julio Braslavsky, Tim Moore, José Luis Silva Farias, José Gerardo Montoya Tena, Franz Baumgartner & Bob Fox, titled "International Development of a Distributed Energy Resource Test Platform for Electrical and Interoperability Certification", at (Joint Conference of 45th IEEE PVSC, 28th PVSEC & 34th EU PVSEC, at 2018) IEEE 7th World Conference on Photovoltaic Energy Conversion (WCPEC), held at Waikoloa Village, HI, USA, from 10th to 15th June 2018.

43. Elenchezhian P, Sudhir Kumar R, Jeykishan Kumar K, Kumar Chinnaiyan V, titled "Power Loss in Series Connected Short String Photovoltaic Modules due to Partial Shading Conditions", at International Conference on Electrical, Electronics, Computers, Communication, Mechanical and Computing (EECCMC), held at Priyadarshini Engineering College, Vellore District, Tamil Nadu, on 28th & 29th January,2019.

44. K. Jeykishan Kumar, titled "Adding solar power for net energy zero building", in International Journal of Scientific & Engineering Research, Vol. No.10, Issue No.3, March 2019.

45. S. Jothibasu, titled "Energy Efficiency improvement studies of Hydro Power Plants", at National Seminar on "RLA studies of hydro power plant components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

46. N. Rajkumar, titled "Fuel audit – a novel tool for performance improvement in power generation", at National Seminar on Energy Efficiency in power generation, held at CPRI, Bengaluru, on 21st & 22nd February, 2019.

47. S. Jothibasu, titled "Energy efficiency improvement in gas turbine power plants", at National Seminar on Energy efficiency in power generation, held at CPRI, Bengaluru, on 21st & 22nd February 2019.

48. S. Jothibasu, titled "Optimisation of auxiliary power in hydro power station", at National Seminar on Energy efficiency in power generation, held at CPRI, Bengaluru, on 21st & 22nd February 2019.

Appendix – 10

49. K. Jeykishan Kumar, titled "Solar PV power- An option for net zero building station", at National Seminar on Energy efficiency in power generation, held at CPRI, Bengaluru, on 21st & 22nd February 2019.

50. S. Prashob, R.Sudhir Kumar, titled "Roof top solar photovoltaic plant-grid connected – performance analysis", at National Seminar on Energy efficiency in power generation, held at CPRI, Bengaluru, on 21st & 22nd February 2019.

51. Archana Kesarkar N, N. Rajkumar, R. Sudhir Kumar, titled "Day ahead solar power forecasting", at National Seminar on Energy efficiency in power generation, held at CPRI, Bengaluru, on 21st & 22nd February 2019.

52. R. Sudhir Kumar, R.A.Deshpande, titled "Electric V2G and its impact on future power systems", in Energy Manager magazine of Society of Energy Engineers and Manager, Vol. No.11, Issue No.04, ISSN 0974-0996, October- December 2018.

53. S. Jothibasu, titled "Design methodology of a small cooling tower", in Cooling India magazine, Vol. No.14, Issue No.8, March 2019.

Earthquake Engineering & Vibration Research Centre

54. R. Panneer Selvam and Yamini Gupta titled "Seismic Qualification of High Voltage Substation Equipment", at International Conference "High Voltage Engineering & Technology" organized by IEEE-Hyderabad at Hotel Manohar, Hyderabad, on 7th & 8th February 2019.

55. R. Panneer Selvam, Yamini Gupta and D. Nagesh Babu titled "Qualification of Equipment for Seismic and Operational Vibration", at National Seminar on "Developments and Wrecks in Overhead Transmission Line Components and Accessories", held at CPRI, Bengaluru, on 12th October 2018.

56. R. Panneer Selvam, A.N.N. Nampoothiri and Yamini Gupta titled "Seismic Qualification of High Voltage Switchgear" at National Conference "Switchgear and Controlgear", held at CPRI, Bengaluru, on 6th & 7th December 2018.

High Power Laboratory

57. Rajaramamohanarao Chennu, S Sudhakara Reddy, Anupam Awasthi, Gurudev T, Maroti, Arun Kumar S, Rajkumar and Sreeram V, titled "Fault detections through SFRA Technique and its interpretations as per IEEE latest standard for Power Transformers" at National Seminar on " Transformer Technologies, best design practices, Standards and Testing Techniques" organised by Short Circuit Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 26th October 2018.

58. Rajaramamohanarao Chennu, S Sudhakara Reddy, Anupam Awasthi, Gurudev T, Maroti, Arun Kumar S, Rajkumar and Sreeram V, titled "Electrical Endurance Testing On Vacuum Circuit Breakers – A Review" at National Conference on Switchgear and Controlgear, organised by High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

Appendix – 10

59. Arunkumar S, Anupam Awasthi, Sudhakara Reddy, Gurudev T, Maroti, Rajaram, Rajkumar, & Sreeram V, titled "Effect of change in contact resistance after short circuit making and breaking operations" at National Conference on Switchgear and Controlgear organised by High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

60. Sreeram V, S Sudhakar Reddy, Anupam Awasthi, T. Gurudev, Maroti, Rajaramamohanarao Chennu, Arunkumar S, Rajkumar M, titled "A study of circuit breaker performance requirements with solar PV and wind generation", at National Conference on Switchgear and Controlgear, organised by High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

61. M Rajkumar, Rajaramamohanarao Chennu, S Sudhakara Reddy, T Gurudev, Maroti, Nagaraj.V, Sreeram.V, Arunkumar.S, Govinda Rao G, M. Chandra sekhar, titled "CPRI Experience on Mechanical Endurance Testing of Circuit Breakers" at National Conference on Switchgear and Controlgear, organised by High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

62. Rajaramamohanarao Chennu titled "CPRI experience on internal arc testing of current transformers and its failure analysis" at TECH-IT 2018 held at Hotel Crown Plaza, Gurgaon, NCR, on 13th & 14th December 2018.

63. Govinda Rao G, M Chandrshekhar, S Sudhakara Reddy, Dr. Pradeep Nirgude, Anupam Awasthi titled "Testing requirements to establish on-line short circuit test facility" at National Conference on Innovation & Best Practices in Transformer Design, Testing & Maintenance, organized by STDS-CPRI, Bhopal, at Hotel Courtyard Marriot, DB City Mall, Bhopal, on 15th February 2019.

64. M Rajkumar, Rajaramamohanarao Chennu, S Sudhakara Reddy, T Gurudev, Maroti, Arunkumar.S, Sreeram.V, titled "High Voltage Winding Dielectric Design" at National Conference on Innovation & Best Practices in Transformer Design, Testing & Maintenance, organized by STDS-CPRI, Bhopal, at Hotel Courtyard Marriot, DB City Mall, Bhopal, on 15th February 2019.

65. Rajaramamohanarao Chennu, S Sudhakara Reddy, Anupam Awasthi, Gurudev T, Maroti, Arun Kumar S, Rajkumar and Sreeram V, titled "Effects of internal arcing faults on transformer" at National Conference on Innovation & Best Practices in Transformer Design, Testing & Maintenance, organized by STDS-CPRI, Bhopal, at Hotel Courtyard Marriot, DB City Mall, Bhopal, on 16th February 2019.

66. Rajaramamohana rao Chennu, Sudhakara Reddy S, Anupam Awasthi, Rajkumar, Maroti , titled "Design and simulation of re-ignition circuit for synthetic testing of HV/EHV circuit breakers" at International Conference "High Voltage Engineering & Technology- ICHVET 2019", organized by IEEE - Hyderabad, on 7th & 8th February 2019.

High Voltage Division

67. C. Prabhakar, Jithin Pauly, U R Sheshagiri Rao & N Vasudev, titled "Mitigation of High Ground Resistance for Hydro Electric Generating Station – A case study", at Two day

Appendix – 10

National Seminar on "Remaining Life Assessment of Hydro Power Plant Components", held at CPRI, Bengaluru, on 7th December 2018.

68. K.Marimuthu, S.Vynatheya & N.Vasudev, and P. Raja, Dept. of Electrical and Electronics Engineering, National Institute of Technology, Trichy, titled "Quality Analysis of Ceramic Insulators under steep front impulse voltage", at 20th National Power System Conference (NPSC) – 2018, held at NIT, Trichy, from 14th to 16th December 2018.

69. Dharmesh Yelamanchi, U R Sheshagiri Rao, N.Vasudev, & A.V.Giridhar, NIT Warangal, titled "Parametric Analysis of Surge Test Circuit for Auto Reclosure to Resolve Experimental Difficulties", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad on 7th & 8th February 2019.

70. K. Marimuthu, S.Vynatheya, N. Vasudev & P.Raja, Dept. of Electrical and Electronics Engineering, National Institute of Technology, Trichy, titled "Quality Analysis of Ceramic Insulators under Electro Thermal Stresses", International Conference on "High Voltage Engineering and Technology (ICHVET 2019)", at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

71. Jithin Pauly P, Prabhakar C, Kanyakumari.M, & N Vasudev, titled ""Determination of Non-inductive Residual Voltages for steep (0.5/629µs) Impulse currents on station class Surge Arresters Blocks" at International Conference on "High Voltage Engineering and Technology (ICHVET-2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

72. Bhurat Puneet, Vijaya Sales Corporation, Bengaluru, K S Meera & N Vasudev, titled "Failure of Distribution-Class Surge Arresters and Preventive Measures", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

73. Chirag.K.Vibhakar, Binita Dutta, V.V.P Engineering College, Rajkot Rafiq Mathersa & N Vasudev, titled "Investigation on Room Temperature Vulcanized Silicon Insulation With and Without ATH Filler Loading by Incline Plane Tracking & Erosion Test Method", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized, by IEEE - Hyderabad, on 7th & 8th February 2019.

74. Rajini.H , K.N.Ravi , Vasudev.N, VTU, Belgaum, Assistant professor, REVA University, Bengaluru, titled "A Study on RTV coating: Ageing and Reduction of Coating length on insulator", at International Conference on "High Voltage Engineering and Technology (ICHVET-2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

75. Nagaraja H P, K N Ravi, Sapthagiri College of Engineering, Bengaluru & N Vasudev, titled "Analysis of Brittle Fracture of Composite Insulators by using Finite Element Technique", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)",

Appendix – 10

held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE Hyderabad, on 7th & 8th February 2019.

76. Ashivini, K N Ravi, Sapthagiri College of Engineering, Bengaluru & N Vasudev, titled "Experimental study on ageing of polymeric insulators by dip method", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

Insulation Division

77. Ashitha P N, K P Meena, S Ganga, titled "Evaluation of the effects of UV radiations on outersheath of cables", at CABLE WIRE 2018 International Conference, held at New Delhi, on 23rd & 24th August 2018.

78. Ashitha P N, K Karunakara, Moumita Naskar, titled "A study on AC/DC tracking and erosion resistance of Liquid Silicone Rubber", at International Conference on "High Voltage Engineering and Technology (ICHVET -2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

79. Moumita Naskar, Ashitha P N, K G Rakesh, titled "Study of the effects of fluorescence UV radiation and low temperature on PVC cable outer sheaths", at 10th International Conference on Power Cable Technology -"CABLETECH 2019", held at CPRI, Bengaluru, on 27th & 28th February 2019.

80. K. Karunakara & G. Kishore Kumar, titled "Power Transformer Core Steel Quality and Their Metrology", at Seminar on Remaining Life Assessment of Hydro Power Plant components, held at CPRI, Bengaluru, on 6th & 7th December 2018.

81. K Karunakara, K G Rakesh, Ashitha P N, Moumita Naskar, titled "Temperature rise test and environmental effect on switch gear and control gear panels Methodology and findings", at Two days National Conference on Switchgear and Control gears, held at CPRI, Bengaluru, on 6th & 7th December 2018.

Information & Publicity Division

82. E.Francis, L. Zhai, H.C. Kim, R.Ramachandran, G.Amarendra, G.M.Balerao, N.Kalarikkal K.T.Varughese, J.Kim, S.Thomas, titled "Morphology correlated free volume studies of multi-walled carbon nanotube plasticized poly (vinyl chloride) nanocomposites: Positronium probes and electrical properties", in Polymer, Vol. No.141, Issue No. 11, page No. 232-243, April, 2018.

83. E.Francis, H.U.Ko, J.W.Kim, H.C. Kim, N. Kalarikkal, K.T. Varughese, J.Kim, S.Thomas, titled "High-k dielectric percolative nanocomposites based on multiwalled carbon nanotubes and polyvinyl chloride," in the Journal of .Material Chemistry-C, Vol. No.6, Issue No.30, Page no. 8152-8159, July, 2018.

Appendix – 10

Materials Technology Division

84. G. Kishore Kumar, titled "Thermal ageing characteristics of Domain Refined Grain Oriented (DRGO) electrical steels", at Seminar on Recent trends on condition monitoring in power equipments, held at SCOPE Complex, New Delhi, on 12th October 2018.

85. T Mallikharjuna Rao & M. Janardhana, titled "Condition Monitoring (Mech.) of Power Plant component, at Seminar on "Recent trends on condition monitoring in power equipments", held at SCOPE Complex, New Delhi, on 12th October 2018.

86. V. Saravana, titled "Effect of Coal Variability on Power Plant Performance and Application of Expert Systems, at National Seminar on "Thermal Power Issues, Challenges and Way Forward", held at Neyveli Lignite Corporation, Neyveli, on 26th & 27th October 2018.

87. M. Janardhana, R.K.Kumar & Arvind Kumar, titled "Corrosion mapping of water wall Boiler tube", at National Seminar on "Thermal Power Issues, Challenges and Way Forward", held at Neyveli Lignite Corporation, Neyveli, on 26th & 27th October 2018.

88. G. Kishore Kumar, titled "Wear debris analysis of lubricants to predict condition of power plant components – case study", at National Seminar on "Thermal Power Issues, Challenges and Way Forward", held at Neyveli Lignite Corporation, Neyveli, on 27th & 28th October 2018.

89. T. Mallikharjuna Rao, R.K.Kumar & Arvind Kumar, titled "Energy Conservation through R&M of thermal power plants", at National Seminar on "Thermal Power Issues, Challenges and Way Forward", held at Neyveli Lignite Corporation, Neyveli, on 26th & 27th October 2018.

90. G. Kishore kumar & M. Janardhana, titled "Optimization of steam curing method for bulk utilization of bottom ash and fly ash", at Seminar on "Thermal Power Issues, Challenges and Way Forward", held at Neyveli Lignite Corporation, Neyveli, on 26th & 27th October 2018.

91. M Venkateshwara Rao, M. Janardhana & Arvind Kumar, titled "Remaining Life Assessment Studies for improvement of reliability and availability of Boilers", at National Seminar on "Thermal Power Issues, Challenges and Way Forward", held at Neyveli Lignite Corporation, Neyveli, on 26th & 27th October 2018.

92. G. Kishore Kumar, titled "Evaluation of prime, non-prime and used transformer core material of cold rolled grain oriented steels", at Seminar on "Transformer technologies , best design practices, Standards and testing techniques", held at CPRI, Bengaluru, on 26th October 2018.

93. T. Mallikharjuna Rao, M. Janardhana & Arvind Kumar, titled "RLA, R & M studies and DPR for R & M activities – CPRI experience", at National Seminar on "RLA of Hydro Power Plant Components," held at CPRI, Bengaluru, on 6th & 7th December 2018.

94. M Janardhana, R.K. Kumar, Kishore Kumar.G & Arvind Kumar, titled "Remaining life assessment of hydro power station penstock", at National Seminar on "RLA of Hydro Power Plant Component", held at CPRI, Bengaluru, on 6th & 7th December 2018.

Appendix – 10

95. M. Janardhana & G. Kishore Kumar, titled "Corrosion assessment of penstock by optical laser 3D scan", at National Seminar on "RLA of Hydro Power Plant Component", held at CPRI, Bengaluru, on 6th & 7th December 2018.

96. M. Janardhana, G. Kishore Kumar & Aravind kumar, titled "Evaluation of integrity of aged penstock supporting structure in hydroelectric generating stations", at National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

97. T. Mallikharjuna Rao & M. Janardhana, titled "Strategy for preventive maintenance of hydro power plant components", on National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

98. R.K. Kumar, V.Saravanan, M.Kamaraj & S. Seetharamu, titled "Computational fluid dynamics approach for prediction of erosion intensities in hydro turbine components hard coated using HVOF and HVAF coatings", at National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th& 7th December 2018.

99. R K Kumar, M Janardhana, K. Kaushik, N L Santhosh, titled "Damage tolerance approach for estimation of the remaining life of turbine-generator shafts of hydro power plants- a case study", at National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

100. R.K. Kumar & M. Janardhana, titled "Failure analysis of pelton turbine runner", at National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

101. G. Kishore Kumar, titled "Transformer condition assessment by DGA - a diagnostic approach", at National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

102. R.K. Kumar, titled "HVAF based thermal spray coatings for improvement of service life of hydro plant components", at National Seminar on "RLA of Hydro Power Plant Components", held at CPRI, Bengaluru, on 6th & 7th December 2018.

103. R .K Kumar, titled "Computational fluid dynamic approach for prediction of erosion life of coal burner splitter plates of 500 mw boiler", at National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st& 22nd February 2019.

104. M. Venkateshwara Rao, titled "Condition assessment studies-a tool for improvement of performance of boilers", at National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st & 22nd February 2019.

105. R .K Kumar, titled "Optimization of flue gas flow in ESP inlet ducts through cold air velocity testing and computational fluid dynamics analysis", at National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st & 22nd February 2019.

106. V. Saravanan, Subha Bhora, titled "Energy generation from waste through microwave based plasma gasification", at National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st & 22nd February 2019.

Appendix – 10

107. V. Saravanan, titled "Best practices for the clinker management in coal fired power plant boilers", at National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st & 22nd February 2019.

108. T. Mallikharjuna Rao, titled "Energy analysis of thermal power plant –an index of sustainability", at National Seminar on "Energy Efficiency in Power Generation", held at CPRI, Bengaluru, on 21st & 22nd February 2019.

109. G. Kishore Kumar & R.K. Kumar, titled "Study of Reactive consumption for Different Core Material of Distribution Transformers", at IEEE International Conference on High Voltage Engineering and Technology(ICHVET-2019), held at Hyderabad, on 7th & 8th February 2019.

Mechanical Engineering Division

110. Praful R. Dongre, titled "Behavior of Insulator under Various Mechanical Loads", at Seminar on "Developments and Wreaks in Overhead Transmission Line Components and Accessories", held at CPRI, Bengaluru, on 12th October 2018.

111. M.D. Anantha Babu, titled "Structural Behaviour of Assembly Modular Cantilever System-A Case Study", at Seminar on "Developments and Wreaks in Overhead Transmission Line Components and Accessories", held at CPRI, Bengaluru, on 12th October 2018.

112. M. Selvaraj, titled "Experimental Evaluation of Transmission Line tower made of Polymer Composite Material", at National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

113. M. Selvaraj & Veerendra Kumar Shukla, titled "Development of Compact overhead power transmission line tower using 8-legged configuration", at National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

114. M. Selvaraj, Vijaya Kumar & Veerendra Kumar Shukla, titled "Failure Analysis of Leg Member at the connection of Single – Angle Leg with Cruciform Leg in Transmission Line tower", at National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

115. Durgesh Kumar Yadav, titled "Reason for failure of Transmission Lines and their Preventive Actions and Strategies", at National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

116. M. Selvaraj & Veerendra Kumar Shukla, titled "Review of failed Transmission Line Towers during Full Scale Testing", at National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

117. Durgesh Kumar Yadav, titled "Comparison between Old IS 802 (Part-1/Sec-1):1995 & New IS 802 (Part-1/Sec-1):2015", at National Conference on "Recent Trends in Overhead Transmission line towers & Its accessories", held at CPRI, Bengaluru, on 20th & 21st December 2018.

Appendix – 10

118. M. Selvaraj, Veerendra Kumar Shukla, Ramesh Babu, titled "An approach to Develop a Compact Transmission Line Tower with Special Configuration", in International Journal of Steel Structures (Springer), Vol. No.19(1), page nos. 213-223, June 2018 issue.

Metering & Utility Automation Division

119. V.Suresh, titled "Benefits of HVDS for Agriculture", Published in Electrical India magazine, issue No.7, Vol.58, July 2018.

120. V. Shivakumar & M. Pradish, titled "Smart Grid Test Beds-Global Developments", in the Proceedings of National Seminar on "Smart Grid, Smart Meter and Communication Technologies", held at CPRI, Bengaluru, on 25th February 2019.

121. V. Suresh, titled "Electromagnetic Interference/Compatibility (EMI/EMC) Qualification of Smart Energy Meters" at National Seminar on "Smart Grid, Smart Meter and Communication Technologies", held at CPRI, Bengaluru, on 25th February 2019.

122. S.Sudha, & B L Jayadev, titled "Calibration facilities for Reference Standard Energy Meters", published in Proceedings of National Seminar on "Smart Grid, Smart Meter and Communication Technologies", held at CPRI, Bengaluru, on 25th February 2019.

123. Shankarmurthy, titled "Electrostatic Discharge (ESD) on Energy Meters", published in National Seminar on "Smart Grid, Smart Meter and Communication Technologies", held at CPRI, Bengaluru, on 25th February 2019.

124. N. Vinothkumar, V. Kumar Chinnaiyan, M. Pradish & S. Prabhakar Karthikeyan, titled "A Recommended Cascaded Structure for Multilevel Inverter with Minimum Power Electronic Components", Published in Electric Power Components and Systems, ISSN: 1532-5008 (Print) 1532-5016 (Online), Taylor & Francis Group, LLC, 1–16, January 2019.

125. Jain S, Pradish M, Paventhan A, Saravanan M, Das A, titled "Smart Energy Metering Using LPWAN IoT Technology", published in Compendium of Technical paper Lecture Notes in Electrical Engineering, Vol. No. 487, Springer, Singapore, Print ISBN: 978-981-10-8248-1; online ISBN: 978-981-10-8249-8; pg. no. 19-28; 11th April 2018.

Power Systems Division

126. Manohar Singh & Anubha Agrawal, "Cluster based protection coordination Using a new voltage current time inverse relay", IEEE PES General meeting 2018, Portland, USA, 5th - 9th August, 2018.

127. Manohar Singh, "Microgrid Short circuit studies", 8th Power India International Conference, at NIT, Kurukshetra, 10th - 12th December, 2018.

128. Amit Jain, "Multi-communication technology based AMI for smart metering in India", 5th International Conference for Convergence in Technology, Pune, India, 29th – 31st March, 2019.

129. Manohar Singh, Anand Prakasha & Meera K S, "Impact of online Testing of Distribution Transformers - A case study", International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

Appendix – 10

130. Manohar Singh & Anubha Agrawal, "Voltage–current–time inverse-based protection coordination of photovoltaic power systems", IET Generation, Transmission & Distribution, Volume 13, Issue 6, pp. 794-804, 26th March, 2019.

131. Manchala Naini Raju, J Sreedevi, Rajashekar P Mandi & Meera K S, "Modular multilevel converters technology: a comprehensive study on its topologies, modeling, control and its applications", IET Power Electronics, Volume 12, Issue 2, pp. 149-169, 20th February, 2019.

132. Manohar Singh, Vishnuvardhan T & Meera K S, "An Innovative Solution for Type Testing of Power Transformers", International Journal of Emerging Electric Power Systems (IJEEPS), Volume 20, Issue 1, 8th February, 2019.

133. Amit Jain, Archana T C & Mohapatra Bikash K Sahoo, "A Methodology for Fault Detection and Classification using PMU Measurements", 20th National Power System Conference (NPSC 2018), NIT, Trichy, 14th – 16th December, 2018.

134. Ashwin N & Meera K S, "Closed Loop Performance Evaluation of Line Differential Relay on RTDS", National Conference on Advances in Electrical, Electronics & Computer Engineering (NCAEECE), Bengaluru, 16th December, 2018.

135. Meera K S & Kaliappan Perumal, "Testing & Calibration of Phasor Measurement Units (PMU)", Power Research – A Journal of CPRI, Volume 14, Issue 1, pp. 1-12, June 2018.

136. J Sreedevi, V Anuradha, Premila Manohar & R S Shivakumara Aradhya, "Performance evaluation of VSC-HVDC link for varying AC system strengths", Power Research – A Journal of CPRI, Volume 14, Issue 1, pp. 105-113, June 2018.

R&D Management Division

137. Tulika Bhattacharjee, R A Deshpande & Arka Chakraborty, titled "Energy Integration in South Asia: A Status Review" at the IEEE International Conference on Sustainable Energy Technologies and Systems, held at Bhubaneshwar, from 26th February 2019 to 1st March 2019.

138. Asim Datta, Rishiraj Sarker, and Imraj Hazarika , titled "An Efficient Technique using Modified pq Theory for Controlling Power Flow in a Single-Stage Single-Phase Grid-Connected PV System.", at "(IEEE Early Access Article)", Dec., 2018, DOI: 10.1109/TII.2018.2890197.

139. Anto Joseph, Raghu Selvaraj, Thanga Raj Chelliah & S. V. Appa Sarma, titled "Starting and Braking of a Large Variable Speed Hydro-Generating Unit Subjected to Converter and Sensor Faults" at "IEEE Transactions on Industry Applications", Vol 54, Issue.4, pp-3372-3382, July-August 2018.

140. R Raja Singh, Raghu Selvaraj & Harshit Mohan Thanga Raj Chelliah titled "Dynamic Performance of Doubly-Fed Hydroelectric Machines under Voltage Unbalance – A Relative Electro Thermomechanical Analysis" at "IEEE Transactions on Industry Applications", Vol.54, Issue-5, pp.4156-4166, Sept-Oct 2018.

141. Raghu Selvaraj, Karthik Desingu, Thanga Raj Chelliah, Deepak Khare & C Bharatiraja titled "Fault Tolerant Operation of Parallel Connected 3L- Neutral-Point Clamped Back-to-Back

Appendix – 10

Converters Serving to Large Hydro-Generating Units" at "IEEE Transactions on Industry Applications", Vol.54, Issue-5, pp.5429-5443, Sept-Oct 2018.

142. R. R. Semwal, Anto Joseph, & Thanga Raj Chelliah titled "Two-Stage Protection for Multi-Channel Power Electronic Converters Fed Large Asynchronous Hydro-Generating Unit" at "2018 International Power Electronics Conference (IPEC-Niigata 2018 -ECCE Asia)", held at Niigata, Japan, from 20th to 24th May 2018.

143. Karthik Desingu, Raghu Selvaraj, Thanga Raj Chelliah & Deepak Khare titled "Effective Utilization of Parallel Connected Megawatt Three-Level Back-to-Back Power Converters in Variable Speed Pumped Storage Units in Variable Speed Pumped Storage Units" at "2018 IEEE Industry Applications Society Annual Meeting (IAS)", held at Portland, Oregon, from 23rd to 27th September 2018.

144. Karthik Desingu, Raghu Selvaraj & Thanga Raj Chelliah, titled "Thermal Loading of Multi-Megawatt Medium-Voltage Power Converters Serving to Variable Speed Large Pumped Storage Units" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IITM Chennai, from 18th to 21st December 2018.

145. Sandeep Kumar, Rahul Goyal, Bhupendra K. Gandhi, and Michel J. Cervantes, titled "Experimental Investigation of a Draft Tube Flow Field in a Francis Turbine during Part Load Operation" at "7th International Conference of Fluid Mechanics and Fluid Power", held at IIT Bombay, 348, from 10th to 12th December 2018.

146. Subodh Khullar, K. M. Singh, Bhupendra K. Gandhi, and Michel J. Cervantes, titled "Effect of Axial Water Jet Size and Velocity on Unsteady Pressure Pulsations in a Deaccelerating Swirling Flow" at "7th International Conference of Fluid Mechanics and Fluid Power", held at IIT Bombay, 235, from 10th to 12th December 2018.

147. Sankar Selvakumar, Mohanty Madhusmita, Chandrasekaran Koodalsamy , Sishaj Pulikottil Simon, and Yog Raj Sood, titled "High-Speed Maximum Power Point Tracking Module for PV Systems" at "IEEE Transaction on Industrial Electronics", Vol.66, No.2, pp. 1119-1129, Feb, 2019.

148. Aleena Swetapadma and Anamika Yadav, titled "An Artificial Neural Network Based Solution to Locate the Multi-Location Faults in Double Circuit Series Capacitor Compensated Transmission Lines" at "International Transactions on Electrical Energy Systems", Issue. 4, Vol.28, April 2018.

149. V.Ashok and Anamika Yadav, titled "A Novel Decision Tree Algorithm for Location Assessment in Dual-Circuit Line based on DCT-BDT Approach" at "18th International Conference on Intelligent Systems Design and Applications (ISDA2018)", held at Vellore Institute of technology, Vellore, Tamilnadu, India, from 6th to 8th December 2018.

150. V. Ashok and Anamika Yadav, titled "Data-Mining Model Based Fault Location Scheme for Cross-Country Faults in Dual-Circuit Transmission Line Using Bagged Regression Tree Approach" at Springer's International Conference on Machine Learning, Image Processing, Network Security and Data Sciences (MIND-2019)", held at National Institute of Technology Kurukshetra, India, on 3rd & 4th March 2019.

Appendix – 10

151. Rashmi, Poornima and Madhu B.M., titled "Effects of multiwalled carbon nanotubes and graphene nanoplatelets filled hybrid epoxy nanocomposites on electrical and mechanical properties" at "10th International Conference on power cables technology (Cabeltech2019)" held at CPRI, Bengaluru, India, on 27th & 28th February 2019.

152. V. Saravanan, K.M. Venkatachalam & M. Arumugam, titled "Analysis of Single Switch DC-DC Converters for Photovoltaic Applications" at "4th International Conference on Bio Energy, Environment and Sustainable Technologies (BEST 2019)", held at Arunai Engineering College, Tiruvannamalai, Tamilnadu, India, from 28th to 30th January 2019.

153. V.Saravanan, M. Arumugam, Andrey V. Brazhnikov & Igor Bolvashenkov, titled "Recent developments of smart grid projects in India" at International Journal of Applied and Fundamental Research, Volume no.2, Issue no.6, pp. 1-2, November, 2018.

154. Nikhil Kumar Sharma and S. R. Samantaray, titled "Validation of Differential Phase-Angle based Microgrid Protection Scheme on RTDS Platform" at "20th IEEE National Power System Conference (NPSC)", held at Tiruchirapalli, India, on 14th December, 2018.

155. Nikhil Kumar Sharma and S. R. Samantaray, titled "Integrated Impedance Based Protection Scheme for Microgrid" at "15th IEEE India Council International Conference (INDICON)", held at Coimbatore, India, on 16th December, 2018.

156. .Pal, Anirban, and Kaushik Basu, titled "A Unidirectional Single-Stage Three-Phase Soft-switched Isolated DC-AC Converter" at "IEEE Transactions on Power Electronics", Volume no.34, Issue no.2, pp no.1142-1158, February 2019.

157. N. Vamanan and V. John, titled "Dual-Comparison One-Cycle Control for Single-Phase Bidirectional Power Converters" at "IEEE Transactions on Industry Applications", Volume no.54, issue no.5, pp no. 4621-4631, Sept – October 2018.

158. S.K. Dam & V. John, titled "High Resolution Converter for Battery Impedance Spectroscopy" at "IEEE Transactions on Industry Applications", Volume no.54, Issue no.2, pp no. 1502-1512, March-April 2018.

159. Anil K Adapa & V. John, titled "An Auxiliary Capacitor Based Active Phase Converter with Reduced Device Current Stress" at "IEEE Transactions on Industrial Electronics", October 2018, DOI: 10.1109/TIE.2018.2877087 (IEEE Early access).

160. K. Saichand & V. John, titled "Adaptive Control Strategy for Ultracapacitor Based Bidirectional DC-DC Converters" at "IEEE Transactions on Industry Applications", October 2018 DOI: 10.1109/APEC.2017.7930843 (IEEE Early access).

161. Venkatramanan D & V. John, titled "Supervisory Control Architecture for Standalone Solar Photo-Voltaic Power Generation System" at "IEEE Energy Conversion Congress and Exposition (ECCE)", held at Portland, OR, USA, September 2018.

162. Venkatramanan D & V. John, titled "Dynamic Phasor Modeling of SRF-PLL based Grid-Tie Inverter under Islanded Conditions" at "IEEE Energy Conversion Congress and Exposition (ECCE)", held at Portland, OR, USA, September 2018.

Appendix – 10

163. Venkatramanan D & V. John, titled "Dynamic Modeling and Analysis of Buck Converter based Solar PV Charge Controller for Improved MPPT Performance" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IIT Madras , Chennai, December 2018.

164. Aditya Zade, Venkatramanan D & V. John, titled "Power Converter Based Impedance Emulation of Passive Loads for Anti-Islanding" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IIT Madras , Chennai, December 2018.

165. Roja P, Venkatramanan D, Sridevi N & V. John, titled "Design and Performance Evaluation of a General Purpose Device Characterization Setup" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IIT Madras , Chennai, December 2018.

166. Anil K Adapa and V. John, titled "Reduced Active Phase Converter for Three Phase Induction Generator based Single Phase Grid-Tied Systems" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IIT Madras , Chennai, December 2018.

167. R. R. Nair & G. Narayanan, titled "Stator Flux Based Model Reference Adaptive Observers for Rotor Position and Speed Estimation in Doubly-Fed Induction Machines" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IIT Madras , Chennai, December 2018.

168. R. R. Nair & G. Narayanan, titled "Emulation of Wind Turbine System using Vector Controlled Induction Motor Drive" at "IEEE Power Electronics, Drives and Energy Systems Conference (PEDES)", held at IIT Madras , Chennai, December 2018.

169. P. Bharadwaj & V. John, titled "Shading Fraction based Global Maximum Power Prediction for Photo-voltaic Energy Conversion Systems" at Proc. World Conference on Photovoltaic Energy Conversion (WCPEC), held at Hawai, USA, June 2018.

170. P. Bharadwaj, Kaustubh Karnataki & V. John, titled "Formation of Hotspots on Healthy PV Modules and Their Effect on Output Performance" at Proc. World Conference on Photovoltaic Energy Conversion (WCPEC), held at Hawai, USA, June 2018.

171. A.K. Adapa, & V. John, titled "Virtual resistor based active damping of LC filter in standalone voltage source inverter" at "IEEE Applied Power Electronics Conference", held at San Antonio, United States, June 2018.

172. A.K. Adapa, & V. John, titled "Common mode filter for EMI mitigation in active phase converter" at "IEEE Applied Power Electronics Conference", held at San Antonio, United States, June 2018.

173. Rudranna Nandhihalli, Radhika M G & Sudha Kamath M K, titled "Synthesis and characterization of Polyaniline /Titanium oxide composites via In-situ chemical oxidative polymerization for supercapacitors" at "International Conference on Innovations and Challenges in Science and Technology (ICICST-2018)", held at Don Bosco Institute of technology –Bengaluru, from 24th to 26th May 2018.

Appendix – 10

174. K Naresh, M Kiran Vamshi, R Velmurugan & R Sarathi, titled "Effect of Humidity, Temperature and Frequency on EPDM Rubber and EPDM/Clay hybrid composites" at "ICCBN", held at Port Elizabeth, SA, from 7th to 9th November, 2018.

175. Tulika Bhattacharjee, Rajendra Ananth Deshpande & Arka Chakraborty, titled "Energy Integration in South Asia: A Status Review", at 1st IEEE International Conference on Sustainable Energy Technologies and Systems (ICSETS) 2019", held at Bhubaneshwar, from 27th February to 1st March 2019.

176. S Kanakambaran, R Sarathi & B Srinivasan, titled "Robust Classification of Partial Discharges in Transformer Insulation Based on Acoustic Emissions Detected Using Fiber Bragg Gratings" at "IEEE Sensors" Journal 18 (24), 10018-10027, December 2018.

177. Harikrishna Muda & Premalata Jena, titled "Phase angle-based PCA technique for islanding detection of distributed generations" at "IET, Renewable Power Generation", Volume no.12, Issue no.6, pp. no.735-746, April 2018.

178. Harikrishna Muda & Premalata Jena, titled "A Droop Controlled Operation of Interlinking Converters for Power Sharing in Hybrid AC/DC Subgrids" at 20th National Power Systems Conference- NPSC 2018, held at National Institute of Technology, Tiruchirappalli, from 14th to 16th December 2018.

179. P. Bharadwaj & V. John, titled "Subcell Modelling of Partially Shaded Photovoltaic Modules" at "IEEE Transactions on Industry Applications", February 2019, doi: 10.1109/TIA.2019.2899813.

180. T S Datta, S. Kar, R Kumar & Reetu Bharthi, titled "Thermal Characteristics of HTS wire for SFCL on Over current operation" at 27th International Cryogenic Engineering Conference", held at OXFORD, UK, September 2018.

181. Agrawal, Neeraj, V. John & Vinod, titled "Enhanced Startup Diagnostics of LCL Filter for an Active Front-End Converter" at "The Korean Institute of Power Electronics, Journal of Power Electronics, Volume 18 Issue 5, Pages.1567-1576 / 2018 / 1598-2092(pISSN) / 2093-4718(eISSN), October 2018.

182. Vinod V & Jayachandra Shenoy U, titled "An Algorithm for Microgrid Protection using Z- Bus matrix formulation in a Central Master Controller" at "IEEE 5th International Conference for convergence in Technology (I2CT 2019)", held at Pune, on 29th & 31st March 2019.

183. R. R. Nair & G. Narayanan, titled "Unified Grid Integration Algorithm for Synchronizationand Power Control of Doubly-Fed Induction Generator" at "2019 IEEE Applied Power Electronics Conference and Exposition (APEC)", held at Anaheim, CA, on 21st March 2019.

184. Ankit Anand, SrikumarNayek, Abhay Singh Gour & V. V. Rao "Simulation and testing of stacked HTS 2G tapes for superconducting cable'', at "International Conference on Power cable technology", held at CABLETECH, CPRI, Bengaluru, 2019, pp. 113-118, on 27th & 28th February 2019.

185. B M Ashwin Desai, P Mishra, N J Vasa, R Sarathi & T Imai, titled "Understanding the Performance of Corona aged epoxy nano micro composites", at "IET Micro and Nano Letters", Vol. 13, Issue 9, 1280-1285, September 2018.

Appendix – 10

186. B M Ashwin Desai, R Sarathi & S Kronhuber, titled "Understanding the water droplet initiated discharges on silicone rubber adopting optical emission and laser induced breakdown spectroscopy". at INAE Letters, Springer, (Online) doi.org/10.1007/s41403-018-0060-1, November 2018.

187. P Mishra, B M Ashwin Desai, R Sarathi & T Imai, titled "Performance analysis of epoxy nanocomposites due to water droplet-initiated discharges under AC and DC voltages and localization of discharges" at "IET Science, Measurement and Technology", (Online) doi.org/10.1049/iet-smt.2018.5056, March 2019.

188. P Mishra, B M Ashwin Desai, N J Vasa, R Sarathi & T Imai (2018), titled "Understanding the performance of gamma-ray-irradiated epoxy nanocomposites, at "IET Micro and Nano Letters" (Online) doi.org/10.1049/mnl.2018.5402, January 2019.

189. B M Ashwin Desai, R Sarathi, J Xavier & A Senugupta (2018), titled "Partical Discharge source classification using time-frequency transformation", at 13th IEEE International Conference on Industrial and Information Systems (ICIIS 2018), held at Ropar, India, on 1st & 2nd December 2018.

190. S. Chandrasekar, B. Karthik & R. K. Arvind Shriram, titled "PD Signal Time-Frequency Map and PRPD Pattern Analysis of Nano SiO_2 Modified Palm Oil for Transformer Insulation Applications" in Journal of Electrical Engineering and Technology, Springer, Vol-13, Issue-2, pp.902-910, April 2018.

191. R.Rajeswari, S.Chandrasekar & Karthik.B, titled "Statistical analysis of PD, Lightning Impulse and BDV Characteristics of Nano-SiO_2 Corn Oil for HV Insulation Applications" in Journal of Electrical Engineering and Technology, Springer Vol-1, Issue-1, pp.1-12, January 2019.

192. Tulika Bhattacharjee, R A Deshpande & Arka Chakraborty, titled "Energy Integration in South Asia: A Status Review", at 1st IEEE International Conference on Sustainable Energy Technologies and Systems (ICSETS) 2019, held at Bhubaneshwar, from 27th February to 1st March, 2019.

Regional Testing Laboratory-Noida

193. G. R. Vishwanath, titled "Special tests for New Insulating Oils as per IS 335 specification", at Workshop on "Performance Evaluation and acceptance criteria of Liquid dielectric for use in power transformer as per national and international test norms", held at STDS-CPRI, Bhopal, on 28th September 2018.

194. Neha Adhikari, titled "Modelling and Investigation of Insulation Defects by partial discharges in HV XLPE Cable", at 8th IEEE India International Conference on Power Electronics (IICPE-2018), held at Jaipur, on 13th to 15th December 2018.

195. Mridula Jain, titled "Various aspects of Energy Meter testing and analysis", at Workshop on "Energy Meter testing and Evaluation", held at RTL-CPRI, Noida, on 19th February 2019.

Appendix – 10

Regional Testing Laboratory -Kolkata

196. P K Maiti, titled "Significance of Transformer Oil Testing", at the "Regional Power Meet", held at Kolkata, on 10th August 2018.

197. P K Maiti, titled "Ageing Behavior of Mineral Oil Based Al_2O_3", at the Workshop on "Performance Evaluation and Acceptance Criteria of Liquid Dielectrics for use in Power Transformers as per National and International Test Norms", held at STDS-CPRI, Bhopal, on 28th September 2018.

Short Circuit Laboratory

198. G. Girija and co-authored by S. Arjuna Rao, N. Maheswara Rao, B. R. Vasudevamurthy, Swaraj Kumar Das & R A Deshpande, titled "Testing Requirements for Non-conventional Current Transformers as per Latest Standard", in the "TECH-IT 2018, Fourth International Conference on Instrument Transformers", held at Hotel Crowne Plaza, Gurgaon, organized by IEEMA, on 13th December 2018.

199. N. Maheswara Rao co-authored by G. Girija, B. R. Vasudevamurthy, Swaraj Kumar Das & R. A. Deshpande, titled "Understanding of HV Current Transformer Failures during Short-Time Current Tests - An Insight of Current Density Calculations beyond IEC Standards", at International Conference on "High Voltage Engineering and Technology (ICHVET-2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019

200. S. Arjuna Rao and co-authored by G. Girija, B. R. Vasudevamurthy, Swaraj Kumar Das & R. A. Deshpande, titled "Measurements and Analysis of Transformer Noise Levels with Substantial Interpretations and Considerations", at Seminar on "Transformers Technologies, Best Design Practices, Standards and Testing Techniques", held at CPRI, Bengaluru, organised by Short Circuit Laboratory, CPRI, Bengaluru, on 26th October 2018.

201. N. Maheswara Rao and co-authored by B. R. Vasudevamurthy, Swaraj Kumar Das & R. A. Deshpande, titled "Analysis of Distribution Transformers Failures during Short-circuit Testing", at the Seminar on "Transformers Technologies, Best Design Practices, Standards and Testing Techniques", held at CPRI, Bengaluru, organised by Short Circuit Laboratory, CPRI, Bengaluru, on 26th October 2018.

202. G. Girija, titled "Constructional Requirement of Transformer Tank", at the Seminar on "Transformers Technologies, Best Design Practices, Standards and Testing Techniques", organised by Short Circuit Laboratory CPRI, Bengaluru, held at CPRI, Bengaluru, on 26th October 2018.

203. N. Maheswara Rao and co-authored by B. R. Vasudevamurthy & Swaraj Kumar Das titled "Short Circuit Withstand Test for LT Panel with Failure Analysis", at the National Seminar on "Temperature Rise test on Transformers and Control Panels – Methodology and Findings, Environmental and its Significance on outdoor Panels", held at CPRI, Bengaluru, organised by Insulation Division and Heat Run Test Lab, CPRI, Bengaluru, on 16th November 2018.

Appendix – 10

204. N. Maheswara Rao and co-authored by B. R. Vasudevamurthy, Swaraj Kumar Das & R A Deshpande, titled "Conditional Short-circuit Test Entails Stringent Designs for LV Switchgear & Controlgear Assemblies as per IEC 61439", at National Conference on "Switchgear and Controlgear", held at CPRI, Bengaluru, organized by High Power Laboratory, CPRI, Bengaluru, on 6th December 2018.

205. S. Arjuna Rao and co-authored by G. Girija, N. Maheswara Rao, B. R. Vasudevamurthy, Swaraj Kumar Das & R A Deshpande, titled "Switchgear for Renewable Energy Power Systems (Reps):IEC Recommendations and Guidelines for Testing", at the National Conference on "Switchgear and Controlgear", held at CPRI, Bengaluru, organized by High Power Laboratory, CPRI, Bengaluru, on 7th December 2018.

206. S. Arjuna Rao and co-authored by G. Girija, titled "Influence of Short-Time Over Currents and Load Switching Capability of Prepayment Meters as per IS 15884 Standard", at one day Seminar on "Prepaid Meters", organised by MUAD, CPRI, Bengaluru, at CPRI, Bengaluru, on 11th January 2019.

Switchgear Testing & Development Station, Bhopal

207. G. Venkateswarlu, Yugal Agrawal, Manoher Singh Takkher, M.K. Wadhwani, J. Santhosh, titled "Significance of Tank Current Measurement during Short Circuit Testing of Power Transformer", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad on 7th & 8th February 2019.

208. Yugal Agrawal, Manoher Singh Takkher, M.K. Wadhwani, J. Santhosh, titled "Type of Failure during Short Circuit Withstand Test of Multi Winding Inverter-Duty Transformer for Solar Application – A Case Study", at International Conference on Modern technology trends in power transformer including OLTC, Bushings etc., held at New Delhi, on 27th & 28th February 2019.

209. G. Venkateswarlu, Yugal Agrawal, Manoher Singh Takkher, M.K. Wadhwani, J. Santosh, titled "Fault Detection Methods for Evaluation of Transformer Short Circuit Test Results", at National Conference on Innovation & best practices in transformer design, testing and maintenance (Transcon 2019), held at Hotel Courtyard, Bhopal, on15th & 16th February, 2019.

210. G. Venkateswarlu, Yugal Agrawal, Manoher Singh Takkher, M.K. Wadhwani, J. Santhosh, titled "12kV Load break switch – A Unique testing facility", at National Conference on Switchgear and Controlgear, organized by High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

211. Yugal Agrawal, titled "Testing & Certification of MV Circuit Breaker", in Electrical India magazine, Vol. No. 58, Issue No.10, Page. No. 42 to 48, October, 2018.

212. B.M.Mehra, Sumbul Munshi, Himangshu Roy, Saumitra Pathak, Vipul Sharma & T.Prabhakaran, titled "Enhancing fault clearing capacity of Miniature Circuit Breaker (MCB)", at Conference on "Switchgear and Controlgear", held at High Power Laboratory, CPRI, Bengaluru, at CPRI, Bengaluru, on 6th & 7th December 2018.

Appendix – 10

213. Leena H Roy, titled "Comparison of New and Old standards in CT & PT testing", at the Seminar on Testing & Evaluation of Instrument Transformers, held at STDS, Bhopal, on 7th December 2018.

214. Manoj Hirani, titled "Effect of Transient Overvoltages on Instrument Transformer", at the Seminar on Testing & Evaluation of Instrument Transformers, held at STDS, Bhopal, on 7th December 2018.

215. Abhishek Verma, titled "Study of Inter turn fault in Instrument Transformer", at the Seminar on Testing & Evaluation of Instrument Transformers, held at STDS, Bhopal, on 7th December 2018.

216. Surendra Kalambe & B.A. Sawale, titled "Evaluation of Smart and Prepayment Energy meter under short circuit fault conditions" at the National Conference on "Smart metering, post paid prepaid & Net metering", held at CBIP, New Delhi, on 6th & 7th September 2018. Paper published in conference proceeding page No.139-145.

217. Priyamvada Chandel & B.A. Sawale, titled "AMI and Theft Detection in Smart Grid: A Review", in the "Journal of Emerging Technologies and Innovative Research (JETIR)", Volume No.5, Issue No.6, Page no. 811-814, June 2018 issue.

218. Ramjeet Singh, titled "Dissolved Gas Analysis-A fault Diagnosis for condition monitoring of Power Transformers in service", at National Conference on "Innovation and Best practices in transformer design, testing and maintenance", held at Hotel Courtyard, Bhopal, organized by STDS-CPRI, Bhopal, on 15th & 16th February 2019.

Training Division

219. M.G. Ananda Kumar titled "Development of Microwave Sintered Cenospheres Reinforced Ceramic Syntactic Foams for Thermal Insulation Applications" at the International Conference on Advanced Ceramics and Nanomaterials for Sustainable Development – ACeND 2018, organized by the Indian Ceramic Society, Karnataka Chapter along with Christ University, Bengaluru, at Bengaluru, from 19th to 21st September 2018.

TRC, Koradi

220. Rajesh Ranjan & Uday Joshi titled " Case Study on Condition Assessment of Pen Stock of Hydro Power Plant " in National Seminar on Assessment of Hydro Power Plant Components" held at CPRI, Bengaluru, on 6th & 7th December 2018.

UHVRL, Hyderabad

221. K. A. Aravind, P. RajaMani, B. Krishna, K. Sandhya and Pradeep M Nirgude, titled "Flashover performance of composite insulators and porcelain insulators", at International Conference on "High Voltage Engineering and Technology (ICHVET-2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

Appendix – 10

222. P. Rajamani, K. A. Aravind, K Rajeshwara Rao, Sandhya K and Pradeep M Nirgude, titled "Experimental studies on Radio Interference of 1200 kV Unipolar UHV DC Transmission line", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

223. P. Rajamani, K. A. Aravind, K Urukundu, B Krishna, Pradeep M Nirgude and P Sivaprasad, titled "Commissioning of UHV Indoor Double Shielded Laboratory for Radio and Partial Discharge Measurement", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE - Hyderabad, on 7th & 8th February 2019.

224. Muhammed Faisal Rahman & Pradeep M Nirgude, titled "Investigation of Particle Initiated Partial Discharges in Transformer Oil with Pressboard Barrier under Divergent Fields", at International Conference on "High Voltage Engineering and Technology (ICHVET-2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized IEEE - Hyderabad, on 7th & 8th February 2019.

225. Muhammed Faisal Rahman & Pradeep M Nirgude, titled "A New Approach to Study Partial Discharge Inception due to Particles in Transformer Oil using Electric Field Analysis", at International Conference on "High Voltage Engineering and Technology (ICHVET- 2019)", held at Hotel The Manohar, Old Begumpet Road, Hyderabad, organized by IEEE -Hyderabad, on 7th & 8th February 2019.

226. Sravanthi Boinala, K. A. Aravind, Pradeep M Nirgude, M.Manjula and V.Kamaraju, titled "Condition Assesment of composite insulators removed from service", at International Conference on Emerging Trends in Engineering (ICETE-2019), held at University College of Engineering, Osmania University, Hyderabad, on 22nd & 23rd March 2019.

227. B. Yashodhara, K. A. Aravind, Pradeep M Nirgude and D. Devendranath, titled "Study of effect of Water Droplets on the surface of polymeric Insulators", in "International Journal of New Technologies in Science and Engineering", Vol. No. 5, Issue No. 5, page No. 111-121, 2018.

228. Muhammed Faisal Rahman, Pradeep M Nirgude, B Nageshwar Rao, Burjupati, titled "Effect of irregular-shaped Cu particles on transformer oil PD characteristics under varying electrode configurations", in IET Science, Measurement & Technology, Vol. No. 13, Issue No. 2, page No. 201-211, March 2019.

229. P. Rajamani, K. A. Aravind and Pradeep M Nirgude, titled "Performance test on 1200kV, AC voltage measuring system of CPRI, UHVRL, Hyderabad", at National Conference on Electrical and Electronics Measurements (NCEEM-2018), held at CSIR – National Physical Laboratory, New Delhi, on 19th & 20th September 2018.

230. K. A. Aravind, P. Rajamani, B. Krishna and Pradeep M Nirgude, titled "Performance test on ±1200kV, HVDC voltage measuring system of CPRI, UHVRL, Hyderabad", at National Conference on Electrical and Electronics Measurements (NCEEM-2018), held at CSIR – National Physical Laboratory, New Delhi, on 19th & 20th September 2018.

Appendix – 10

231. P. Rajamani, K. Urukundu and Pradeep M Nirgude, titled "Measurement of Radio Interference Emission Around +/-100 MVAR STATCOM Valve Building Near 400/220 kV Substation", at National Power Systems Conference (NPSC-2018), held at NIT, Tiruchirappalli, from 14th to 16th December 2018.

232. P. Rajamani, K. A. Aravind, K. Urukundu, B. Krishna, K. Rajeshwara Rao & K. Sandhya, titled "Experiences on Testing of Partial Discharge Measurement and EMC including Special Tests on Instrument Transformers", at National Seminar on Testing and Evaluation of Instrument Transformers, organized by STDS, CPRI, Bhopal, at Bhopal, on 7th December 2018.

233. G. V. Rao, P. Rajamani, K. Urukundu, B. Krishna, K. Rajeshwara Rao & K. Sandhya, titled "Difficulties and challenges in High Voltage Testing of EHV/UHV switchgear", at National Conference on Switchgear & Controlgear, held at CPRI, Bengaluru, on 6th & 7th December 2018.

234. Pradeep M Nirgude & P. Rajamani, titled "Simulation & identification of Disc-to-Disc Insulation Failures of Power Transformer", at National Conference on Innovation & Best Practices in Transformer Design, Testing & Maintenance, held at STDS-CPRI, Bhopal, on 15th & 16th February 2019.

235. Pradeep M Nirgude, K.Sahitya Yadav & M. Prameela, titled "Interpreting SFRA Data for Diagnosing Transformer Winding Displacement and Deformations using Transfer Function Parameters", at National Conference on Innovation & Best Practices in Transformer Design, Testing & Maintenance, held at STDS-CPRI, Bhopal, on 15th & 16th February 2019.

Appendix – 11

M.A. NARASIMHAN & CO.,
Chartered Accountants

Off. : 080-23344701 / 8904088990
Fax. : 080-23562814
E-mail : manco@mancoca.com / mancoca@gmail.com
Url : www.mancoca.com

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

Date : _____

Independent Auditor's report

To
The Governing Council
Central Power Research Institute
Bangalore

Report on the Financial Statements:

We have audited the accompanying financial statements of **Central Power Research Institute** ("the institute"),a society formed under the Societies Act which comprise the Balance Sheet as at **31st March, 2019**, and the Income and Expenditure account for the year then ended, and other explanatory information.

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements give a true and fair view in conformity with the accounting principles generally accepted in India, of the state of affairs of the Institute as at March 31, 2019, and **surplus** for the year ended on 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 institute in accordance with the Code of Ethics issued by the Institute of Chartered Accountants of India. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of Management and those charged with governance for the financial statements:

The management of Institute is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance of the Institute in accordance with accounting principles generally accepted in India. This responsibility also includes maintenance of adequate accounting records for safeguarding of the assets of the Company and for preventing and detecting frauds and other irregularities; selection and application of appropriate implementation and maintenance of accounting policies; making judgments and estimates that are reasonable and prudent; and design, implementation and maintenance of adequate internal financial controls that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the financial statement that give a true and fair view and are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Institute's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using

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

Appendix – 11

M.A. NARASIMHAN & CO.,
Chartered Accountants

Off. : 080-23344701 / 8904088990
Fax. : 080-23562814
E-mail : manco@mancoca.com / mancoca@gmail.com
Url : www.mancoca.com

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

Date : _____

the going concern basis of accounting unless management either intends to liquidate the institute or to cease operations, or has no realistic alternative but to do so.

The Management is also responsible for overseeing the Institute's financial reporting process.

Auditor's Responsibilities for the Audit of financial statement:

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

Key Audit Matters for the attention of the Management:

1. Fixed assets register does not account for the depreciated value of the asset and needs regular updation.

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

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

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

Place: Bengaluru
Date: 18-06-2019.

Appendix – 11

CENTRAL POWER RESEARCH INSTITUE, BANGALORE.

BALANCE SHEET AS AT 31ST MARCH 2019

(Amount in ₹)

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	1055,56,60,633	959,06,41,223
Reserves and Surplus	2	63,88,83,227	48,77,32,989
Earmarked and Endowment Funds	3	722,69,74,536	646,20,79,260
Grants from Government of India	4	40,45,02,395	43,54,57,008
Current Liabilities and Provisions	5	51,21,59,025	57,73,95,909
TOTAL		**1933,81,79,816**	**1755,33,06,389**
Assets			
Fixed Assets	6	1025,16,60,633	928,66,41,223
Less: Depreciation provided		244,94,12,137	224,97,41,484
		780,22,48,496	703,68,99,739
Investments from Earmarked & Endowment Funds	7	631,08,60,144	578,11,49,424
Current Assets, Loans and Advances	8	522,50,71,176	473,52,57,226
TOTAL		**1933,81,79,816**	**1755,33,06,389**
Notes on Accounts & Contingent Liability	16		
Significant Accounting Policies	17		

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

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

Bangalore
18-06- 2019

(C.S. Murali Krishna)
Chief Accounts Officer

(V.S Nandakumar)
Director General

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

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

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2019

(Amount in ₹)

INCOME	Schedule	Current Year	Previous Year
Income from Test Fee & Consultancy	9	175,80,83,325	165,99,38,977
Fees	10	2,47,87,232	2,11,13,237
Interest Earned	11	25,15,01,994	22,21,57,868
Other Income	12	1,05,39,679	72,50,977
TOTAL (A)		**204,49,12,230**	**191,04,61,059**
EXPENDITURE			
Research Establishment Expenses	13	127,37,25,936	113,76,12,140
Research Administrative Expenses	14	53,82,90,399	50,30,39,543
Depreciation	15	19,96,70,655	19,77,67,693
TOTAL (B)		**201,16,86,991**	**183,84,19,376**
Balance being excess of Income over Expenditure (A-B)		3,32,25,239	7,20,41,683
Add:			
Opening Balance of General Reserve Account		1,01,01,814	1,43,62,947
Excess Assets Capitalised out of ICICI loan		-	5,05,192
Less:			
Assets directly acquired out of General Reserve		27,20,276	98,17,244
Assets (Non Plan) acquired transferred to Capital Reserve		1,45,30,165	6,69,90,764
CLOSING BALANCE OF GENERAL RESERVE		**2,60,76,613**	**1,01,01,814**
Notes on Accounts & Contingent Liability	16		
Significant Accounting Policies	17		

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

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

Bangalore
18-06-2019

(C.S. Murali Krishna)
Chief Accounts Officer

(V.S Nandakumar)
Director General

(M.A. Partha narayan)
Partner
Membership No. 028294

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

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

	SCHEDULE - 1	Current Year		Previous Year	
	CAPITAL RESERVE REPRESENTING ASSETS ACQUIRED FROM GRANT-IN-AID FROM GOVT. OF INDIA AND INTERNAL RESOURCES				
a)	Under Plan Capital (Grant)	831,05,14,602		761,58,72,037	
	Addition during the year	81,88,03,240		74,92,69,982	
	Less: Sale of Fixed Assets	-		4,92,14,634	
	Less: Sale of Fixed Assets	-		54,12,783	
			912,93,17,842		831,05,14,602
b)	Under Plan Capital (Grant) (For M/s. NHPTL Equity Capital)	24,00,00,000		24,00,00,000	
	Addition during the year	-	24,00,00,000	-	24,00,00,000
c)	Under R&D Plan	30,10,97,866		29,18,09,760	
	Addition during the year	317,87,230	33,28,85,096	92,88,106	30,10,97,866
d)	Assets Acquired out of RSoP & NPP Management Fund	24,04,110		24,04,110	
	Addition during the year	-	24,04,110	-	24,04,110
	Sub Total (A)		970,46,07,048		885,40,16,578
	ASSETS ACQUIRED FROM INTERNAL RESOURCES				
e)	Under Plan Capital (CPRI's 10% Contribn.)	10,97,55,040		71,03,651	
	Addition during the year	6,81,18,187		10,26,51,389	
			17,78,73,227		10,97,55,040
f)	Under Non-Plan	21,31,38,621		14,61,47,857	
	Addition during the year	1,45,30,165		6,69,90,764	
	Less: Assets disposed-off	-	22,76,68,786	-	21,31,38,621
g)	Under Non-Plan (Equity Participation)	6,40,00,000		6,40,00,000	
	Addition during the year	-	6,40,00,000	-	6,40,00,000
h)	Assets Acquired out of General Reserve	7,33,65,255		6,35,48,011	
	Addition during the year	27,20,276	7,60,85,531	98,17,244	7,33,65,255
i)	Assets Acquired out of Sponsored Schemes	22,19,58,138		18,41,95,325	
	Addition during the year	2,90,60,311	25,10,18,449	3,77,62,813	22,19,58,138
j)	Capitalisation of Assets acquired out of Loan	4,89,94,808		4,95,00,000	
	Less: Excess Assets Capitalisation	-	4,89,94,808	5,05,192	4,89,94,808
k)	Surplus on sale of Asset	54,12,783		54,12,783	
	Addition during the year	-	54,12,783	-	54,12,783
	Sub Total (B)		85,10,53,584		73,66,24,645
	TOTAL (A+B)		**10,55,56,60,633**		**9,59,06,41,223**

Place : Bangalore,
Date : 18-09-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

	SCHEDULE 2	Current Year		Previous Year	
	RESERVES AND SURPLUS				
A	**GENERAL RESERVE**				
	As per last Account	1,01,01,814		1,43,62,947	
	Add: Surplus during the year	3,32,25,239		7,20,41,683	
	Add: ICICI Excess Loan taken	-		5,05,192	
	Less: Assets directly acquired out of General Reserve	27,20,276		98,17,244	
	Less: Assets (Non Plan) acquired transferred to Capital Reserve	1,45,30,165		6,69,90,764	
	Net Balance A		**2,60,76,612**		**1,01,01,814**
B	**Reserve for Capital Expenditure out of CPRI generated funds**				
	Opening Balance	41,52,44,960		36,78,96,349	
	Add: Provision / contribution made during the year 2018-19	20,00,00,000		15,00,00,000	
	Less: Utilisation during the year	6,81,18,187		10,26,51,389	
	Net Balance B		**54,71,26,773**		**41,52,44,960**
C	**MAINTENANCE, RENEWAL & OBSOLESCENCE RESERVE**				
	Opening Balance	6,23,86,215		7,21,74,349	
	Add: Interest earned, Loan from HO & accrued during the year	41,02,399		48,72,679	
	Add: Additional Security Deposit during the year	-		1,75,970	
	Less: Utilisation during the year	8,08,773		148,36,783	
	Net Balance B		**6,56,79,841**		**6,23,86,215**
	TOTAL (A+B)		**63,88,83,227**		**48,77,32,989**

Place : Bangalore,
Date: 18-06-2019

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

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

	SCHEDULE 3:	Current Year		Previous Year	
	FARMARKED & ENDOWMENT FUNDS:				
A	**SUPERANNUATION FUND**				
	Opening Balance	583,39,19,222		527,99,52,037	
	Add: Receipts from other organisations	-		-	
	Add: Contribution during the year	68,00,00,000		55,00,00,000	
	Add: Interest received and accrued	39,62,35,069		37,68,52,808	
	Less Utilisation for Pension payments	32,65,73,790		37,28,85,623	
	Sub Total	**658,35,80,501**		**583,39,19,222**	
	Add: Security Deposit	9,52,717		13,31,990	
	Add: Pension Payable /Others	1,270		7,95,885	
	Net Balance - A		**658,45,34,488**		**583,60,47,097**
B	**PROVIDENT FUND**				
	Opening Balance	37,71,40,410		36,86,09,394	
	Add: Transfer from Other Organisation	-		1,71,440	
	Add: Subscriptions & Repayments	6,81,92,996		6,68,63,668	
	Add: Interest Paid / Credited to PF subscribers	2,85,53,095		2,74,69,703	
	Less Withdrawals	10,40,84,790		8,59,73,795	
	Sub Total	**36,98,01,711**		**37,71,40,410**	
	Add: Balances under Security Deposit etc.,	958		958	
	Opening Balance (Additional Interest)	2,65,43,230		252,90,201	
	Add: Additional Interest earned (Excess of Interest Paid / over interest earned 36275370-28553095)	97,22,275		12,53,029	
	Total	3,62,65,505		265,43,230	
	Net Balance - B		**40,60,68,174**		**40,36,84,598**
C	**NEW PENSION SCHEME FUND**				
	(i) Opening Balance (Employee's Contribution)	21,137		21,137	
	Add: Subscriptions/Employees' Contribution	3,783		3,783	
	Add: Interest on Employees' Contribution (cumulative)	8,290		8,290	
	(ii) Opening Balance (Employer's Contribution)	21,136		21,136	
	Add: Employer's Contribution	3,783		3,783	
	Add: Interest on Employer's Contribution (cumulative)	8,290		8,290	
	Sub Total	66,419		66,419	
	Add: Additional Interest earned	1,74,280		1,65,462	
	Add: Balances under Security Deposit etc.,	16,782		15,782	
	Net Balance - C		**2,57,481**		**2,48,663**
D	**OTHER FUNDS**				
	(i) Sponsored Scheme Deposits		15,14,68,544		13,51,63,711
	(ii) IHRD Scheme Deposits		8,46,45,849		8,69,35,191
	TOTAL (A+B+C+D)		**722,69,74,536**		**646,20,79,260**

Place: Bangalore
Date : 18-06-2019

M.A. NARASIMHAN & Co Chartered Accountants CAI Firm Reg. No. 002347S Bangalore

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

		SCHEDULE 4	Current Year		Previous Year	
		GRANTS FROM GOVT. OF INDIA, & OTHERS				
A		Under Plan Capital				
		Opening Balance	38,34,28,646		68,72,38,924	
		Add: Grant received during the year	69,34,00,000		39,53,00,000	
		Add: Sale of Assets	-		4,92,14,634	
		Add: Sale of Assets	-		54,12,783	
		Less: Grant utilised during the year	81,88,03,240		74,92,69,982	
		Less: Grant refunded to M o P during the year	-		44,67,713	
		Grant Balance		25,80,25,406		38,34,28,646
B		Under R&D Plan				
		Opening Balance	71,37,847		11,05,53,687	
		Add: Grant received during the year	10,70,07,000		77,00,000	
		Less: Grant utilised during the year	3,97,14,000		11,11,15,840	
		Grant Balance	-	7,44,30,847		71,37,847
C		Under RSoP Scheme				
		Opening Balance	-		42,36,955	
		Add: Grant received during the year	7,09,66,000		1,20,97,000	
		Less: Grant utilised during the year	6,38,91,374		1,63,33,955	
		Grant Balance		70,74,626		-
D		Under NPP Scheme				
		Opening Balance	4,48,90,515		1,99,45,000	
	i)	Add: Grant received during the year	7,20,27,000		8,84,87,000	
		Less: Grant utilised during the year	5,19,46,000		6,35,41,485	
		Grant Balance		6,49,71,515		4,48,90,515
		TOTAL		**40,45,02,395**		**43,54,57,008**

Place : Bangalore,
Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

		SCHEDULE 5	Current Year		Previous Year	
		CURRENT LIABILITIES AND PROVISIONS				
A		**CURRENT LIABILITIES**				
	1	**Sundry Creditors**				
		a) For Supplies & Services	61,32,795		52,46,155	
		b) For Expenses (Non-Plan)	1,60,66,913		3,09,43,891	
		c) For Expenses (Plan)	-		2,81,81,326	
		d) For Salaries	4,95,96,045		4,56,72,180	
		e) For Others	4,58,36,775		3,29,17,786	
		f) Interest received on Grant Account to be refunded to M o P	14,46,603		43,19,919	
				11,90,79,131		14,72,81,257
	2	**Deposits Received**		21,03,97,006		23,15,62,364
	3	**Statutory Liabilities**		1,46,38,277		2,02,50,119
	4	**EMD, Security Deposits and others**		11,14,89,885		11,54,41,295
	5	**Reserve for Doubtful debts**		5,65,54,725		6,28,60,873
		TOTAL		**51,21,59,025**		**57,73,95,909**

Place: Bangalore,

Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

	SCHEDULE 6	GROSS BLOCK					
	FIXED ASSETS	Cost/valuation As at beginning of the year	Additons during the year (Non-Plan)	Additons during the year (RC-Project)	Transfer from WIP	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	100,76,72,142	71,43,176	-	9,50,99,423	110,99,14,741	100,76,72,142
3	PLANT MACHINERY & EQUIPMENT	618,33,91,752	87,60,742	3,17,87,230	21,83,44,749	644,22,84,474	618,33,91,752
4	VEHICLES	52,34,688	3,47,074	-	-	55,81,762	52,34,688
5	FURNITURE, FIXTURES	2,90,61,120	9,99,449	-	2,21,653	3,02,82,222	2,90,61,120
6	LIBRARY BOOKS & FILM	1,55;45,927	-	-	-	1,55,45,927	1,55,45,927
7	MACHNERY & EQUIPMENTS (SPONSERED PROJECTS)	22,19,58,138	2,90,60,311	-	-	25,10,18,448	22,19,58,138
	TOTAL	**753,25,48,627**	**4,63,10,752**	**3,17,87,230**	**31,36,65,825**	**792,43,12,435**	**753,25,48,627**
B	CAPITAL WORK-IN-PROGRESS	164,43,37,556	81,88,03,240		(31,36,65,825)	214,94,74,971	164,43,37,556
	CAPITAL WORK-IN-PROGRESS (CPRI GRANT PORTION)	10,97,55,040	6,81,18,187			17,78,73,227	10,97,55,040
	LESS: DEPRECIATION provided upto 31-03-2019	224,97,41,482	19,96,70,655			244,94,12,137	224,97,41,482
	GRAND TOTAL	**703,68,99,741**				**780,22,48,496**	**703,68,99,740**

Place : Bangalore,
Date 18-05-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

	SCHEDULE 7	Current Year	Previous Year
	INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS		
A	**SUPERANNUATION FUND INVESTMENT ACCOUNT**		
	1 In Government Securities	-	-
	Investment in LIC of India, under Superannuation Scheme	586,56,73,325	533,76,87,128
	2 Bonds	-	-
	3 Term Deposits with Banks & Financial Institutions	-	-
	4 Interest Accrued on Superannuation Fund Investments	-	-
	5 TDS / Receivables	2,24,87,364	2,24,87,364
	6 Cash at Bank (S.B. Account No.10356553751)	1,63,73,799	1,70,41,670
	Total - A	**590,45,34,488**	**537,72,16,162**
B	**PROVIDENT FUND INVESTMENT ACCOUNT**		
	1 In Government Securities	3,64,92,938	54,34,189
	2 Bonds	26,00,00,000	28,00,00,000
	3 Term Deposits with Banks & Financial Institutions	9,25,00,000	10,20,00,000
	4 Interest Accrued on Provident Fund Investments	86,47,660	75,91,328
	5 TDS Receivables	50,05,366	29,25,366
	6 Cash at Bank (S.B. Account No.10356553740)	34,22,210	57,33,716
	Total - B	**40,60,68,174**	**40,36,84,598**
C	**NEW PENSION SCHEME FUND INVESTMENT ACCOUNT**		
	1 Cash at Bank (S.B. Account No.30019323462)	2,57,481	2,48,663
	Total - C	**2,57,481**	**2,48,663**
	Total (A+B+C)	**631,08,60,144**	**578,11,49,424**

Place : Bangalore,

Date : 18-06-2019

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

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Balance Sheet as at 31st March 2019

(Amount in ₹)

		SCHEDULE 8	Current Year		Previous Year	
		CURRENT ASSETS, INVESTMENTS, LOANS & ADVANCES				
A		**CURRENT ASSETS:**				
	1	**Inventories:**				
		a) Stores and Spares		13,99,364	3,793	
		Less: Provision for diminision in Value of stores stock	-		-	3,793
	2	**Sundry Debtors:**				
		a) Debts Outstanding for a period exceeding six months	5,65,54,725		6,28,60,873	
		b) Debts Outstanding for a period not exceeding six months	-	5,65,54,725	-	6,28,60,873
	3	**Cash balances in hand (including cheques/drafts and imprest)**		2,22,543		1,64,208
	4	**Deposits and Bank Balances:**				
		a) Deposits with Scheduled Banks (includes Non Plan Margin Money)	2,57,69,000		1,89,57,000	
		b) Margin Money Deposits on Grant account	19,09,57,387		26,24,76,000	
		c) Deposits earmarked for Superannuation Fund	68,00,00,000		55,00,00,000	
		d) Savings Accounts	34,05,24,334	123,72,50,721	40,88,67,323	124,03,00,323
		e) Deposits of Maintenance, Renewal & Obsolescence Reserve	6,25,00,000		6,25,00,000	
		f) Savings Bank account of Maintenance, Renewal & Obsolescence Reserve	19,80,655		2,54,196	
		g) Accrued interest on MRO Fund & TDS Receivable, etc.,	11,99,187	6,56,79,842	16,32,019	6,43,86,215
B	I	**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 Investments				
		Government Securities	8,70,19,704		310,58,749	
		Bonds	143,50,00,000		222,29,91,172	
		Long Term Deposits with Banks & Financial Institutions	107,05,00,000	259,25,19,704	-	225,40,49,921
C		**LOANS, ADVANCES & OTHER ASSETS**				
		a) Deposits with Govt.Depts & others	8,02,18,755		8,04,92,387	
		b) Advances to Employees	49,59,762		93,37,780	
		c) Prepaid Expences	6,16,822		15,44,274	
		d) Accrued interest	21,84,59,285		16,00,57,676	
		e) TDS Receivables	59,44,95,644		44,42,42,163	
		f) Claims Receivable	9,02,450.00		2,03,13,846	
		g) Other Advances	77,91,560		3,35,03,767	
		h) Loan to NHPTL	6,00,00,000	96,74,44,278	6,00,00,000	80,94,91,893
		TOTAL		**522,50,71,176**		**473,52,57,226**

Place : Bangalore,
Date : 18-06-2019

M.A. NARASIMHAN & CO. ICAI Firm Reg. No. 002275 Bangalore Chartered Accountants

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2019

(Amount in ₹)

	SCHEDULE 9	Current Year	Previous Year
	INCOME FROM TEST FEE & CONSULTANCY		
a)	**Test Fee**	157,18,92,854	146,42,65,593
b)	**Consultancy Services Charges**	18,61,90,471	19,56,73,384
	TOTAL	**175,80,83,325**	**165,99,38,977**

Place : Bangalore,
Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2019

(Amount in ₹)

	SCHEDULE 10	Current Year	Previous Year
	FEES		
a)	**Training Fee**	102,55,159	117,36,996
b)	**Seminar Fee**	1,45,32,073	93,76,241
	TOTAL	**2,47,87,232**	**2,11,13,237**

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

Place : Bangalore,
Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2019

(Amount in ₹)

	SCHEDULE 11	Current Year	Previous Year
	INTEREST EARNED		
a)	**Interest on Term Deposits with Banks & Financial Institutions**	24,94,84,581	22,09,49,826
b)	**Interest on Loans & Advances to Employees**	20,17,413	12,08,042
	TOTAL	**25,15,01,994**	**22,21,57,868**

M.A. NARASIMHAN & CO. Firm Reg. No. 0023475 Bangalore Chartered Accountants

Place : Bangalore,
Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2019

(Amount in ₹)

		SCHEDULE 12	Current Year	Previous Year
		OTHER INCOME		
1)		**Fees for Miscellaneous Services**		
	a)	Sale of Publications	-	4,66,612
	b)	Library Receipts	5,150	2,175
2)		**Miscellaneous Income**		
	a)	Application fee on recruitment	23,88,320	8,000
	b)	Sale of Tender forms	4,67,368	2,45,700
	c)	Licence fees	22,29,070	24,58,276
	d)	Rent Receipts	22,25,694	30,72,492
	e)	Sale of Scrap	6,18,300	1,36,330
	f)	Others	26,05,777	8,61,392
		TOTAL	**1,05,39,679**	**72,50,977**

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

Place : Bangalore,
Date 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2019

(Amount in ₹)

	SCHEDULE 13	Current Year	Previous Year
	RESEARCH ESTABLISHMENT EXPENSES		
a)	**Salaries and Wages including Bonus**	54,08,25,244	54,49,13,441
b)	**Staff Welfare Expenses**	2,94,56,547	2,67,25,871
c)	**Expenses on Employee's Retirement and Terminal Benefits**	68,00,00,000	55,00,00,000
d)	**Expenses on Medical Facilities**	2,34,44,145	1,59,72,828
	TOTAL	**127,37,25,936**	**113,76,12,140**

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

Place: Bangalore,
Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure for the year ended 31st March 2019

(Amount in ₹)

	SCHEDULE 14	Current Year	Previous Year
	RESEARCH ADMINISTRATIVE EXPENSES		
a)	Electricity and Power	8,09,04,788	7,82,38,117
b)	Water Charges	11,48,758	7,30,415
c)	Office Expenses	5,24,16,493	5,29,42,794
d)	Repairs and Maintenance	16,94,78,357	17,32,42,197
e)	Rent, Rates and Taxes	10,05,026	10,02,664
f)	Vehicles Running and Maintenance Expenses	14,85,104	33,05,970
g)	Postage, Telephone and Communication Charges	25,85,009	36,67,395
h)	Printing and Stationary	7,48,212	16,75,578
i)	Travelling and Conveyance Expenses	1,23,51,524	1,48,34,151
j)	Expenses on Seminar & Workshops	1,04,88,118	87,23,785
k)	Subscription Expenses	83,275	19,467
l)	Expenses on Fees	1,00,243	71,333
m)	Auditors Remuneration	1,75,000	1,75,000
n)	Professional Charges	17,20,835	51,72,295
o)	Library Expenses	43,64,327	37,27,933
p)	Training Expences	12,30,769	13,51,790
q)	Publication Expenses	1,98,600	5,55,338
r)	Advertisement and Publicity	41,12,109	36,03,322
s)	Provision for Doubtful Debts Realised	-63,06,148	
t)	Transfer to 'Reserve for Capital Expenditure' during financial year 2018-19	20,00,00,000	15,00,00,000
	TOTAL	**53,82,90,399**	**50,30,39,543**

Place: Bangalore,
Date : 18-06-2019

Appendix – 11

CENTRAL POWER RESEARCH INSTITUTE, BANGALORE.

Schedules forming part of Income & Expenditure
for the year ended 31st March 2019

(Amount in ₹)

	SCHEDULE 15	Current Year	Previous Year
	DEPRECIATION		
a)	**Depreciation for the year**	19,96,70,655	19,77,67,692
	TOTAL	**19,96,70,655**	**19,77,67,692**

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

Place : Bangalore,
Date : 18-06-2019

CENTRAL POWER RESEARCH INSTITUTE

Schedule forming part of Income & Expenditure for the year ended 31st MARCH 2019

SCHEDULE 16
DEPRECIATION

YEAR	GROSS BLOCK				DEPRECIATION				NET BLOCK	
	OB	Additions		TOTAL	%	OB	For the Year	Total	OB	CB
		Additions	Transfer from W-I-P to Assets							
1	2	3	4	5		6	7	9	10	11
				(2+3-4)				(6+7-8)	(2-6)	(5-9)
Land	6,96,84,860	-		6,96,84,860					6,96,84,860	6,96,84,860
Buildings	1,00,33,92,175	71,43,176	9,50,99,423	1,10,56,34,774	3	44,17,95,079	3,43,62,367	47,61,57,446	56,15,97,096	62,94,77,327
Buildings (ICICI)	42,79,967	-	-	42,79,967	3	16,64,151	1,42,951	18,07,102	26,15,816	24,72,865
Plant & Machinery	6,13,86,76,911	4,05,47,973	21,83,44,749	6,39,75,69,633	5	4,09,98,06,956	15,21,95,461	4,25,20,02,417	2,03,88,69,955	2,14,55,67,216
Plant & Machinery (ICICI)	4,47,14,841	-	-	4,47,14,841	5	2,74,28,657	21,23,955	2,95,52,612	1,72,86,184	1,51,62,229
Plant & Machinery (Spons)	22,19,58,138	2,90,60,311	-	25,10,18,449	5	9,58,79,043	92,52,325	10,51,31,368	12,60,79,095	14,58,87,081
Furniture & Fixtures	2,90,61,120	9,99,449	2,21,653	3,02,82,222	6	1,57,27,449	15,51,661	1,72,79,110	1,33,33,671	1,30,03,112
Vehicles	52,34,688	3,47,074	-	55,81,762	10	48,61,167	41,935	49,03,102	3,73,521	6,78,660
Library Books	1,53,20,774	-	-	1,53,20,774	95	1,45,54,735	-	1,45,54,735	7,66,039	7,66,039
Films (docmntry)	2,25,153	-	-	2,25,153	95	2,13,895		2,13,895	11,258	11,258
Sub Total	**7,53,25,48,627**	**7,80,97,983**	**31,36,65,825**	**7,92,43,12,435**						
Capital Works in Progress (M o P)	1,64,43,37,556	81,88,03,240	31,36,65,825	2,14,94,74,971					1,64,43,37,556	2,14,94,74,971
Capital W-I-P (CPRI)	10,97,55,040	6,81,18,187	-	17,78,73,227					10,97,55,040	17,78,73,227
TOTAL	**9,28,66,41,223**	**96,50,19,410**		**10,25,16,60,633**		**4,70,19,31,132**	**19,96,70,655**	**4,90,16,01,787**	**4,58,47,10,091**	**5,35,00,58,846**

Place: Bangalore,
Date : 18-06-2019

M.A. NAG & SHAH ICAI Firm Reg. No. 002347S Bangalore Chartered Accountants

Appendix – 11

Schedule – 16

Significant Accounting Policies attached to and forming part of Accounts for the year ended 31st March 2019.

Background: - The Institute, an autonomous body under Govt. of India, Ministry of Power established through a resolution vide No.33 (14)/74-Policy: dated 21/10/1974 is totally focused on Power Research. The Institute has been recognized by Ministry of Science & Technology as an S&T Institution. The Institute has been further recognized as Scientific and Industrial Research Organization by Government of India, Ministry of Science and Technology vide their letter No. 11/68/88-TU-V, dated 05/04/2017 and valid up to 31.03.2020. 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.

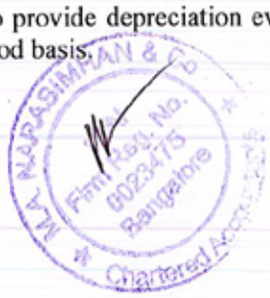
1. **Method of Accounting:**
The financial statements have been prepared to comply with the Generally Accepted Accounting Principles. The financial statements have been prepared under the historical cost convention on an accrual basis. The accounting policies have been consistently applied by the Institute.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



Appendix – 11

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 2018 is of the order of Rs.245,21,89,649.00 (for assets additions from 1981).

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

4. **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.

5. **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.

6. **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.

7. **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. The Institute is under correspondence with users to get the Form 16 to the extent of around 761.38 Lakhs.

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

8. **Sundry debtors and advances received.**

Till 2017-18 the client accounts for testing & consultancy were maintained independently with reference to each cost center. Thereby a single entity has been shown as debtor say in 5 different cost centers while a creditor in other cost centers for advances received. Therefore the volume of debtors and creditors was larger. To make a meaningful and more accurate disclosure, entity wise consolidation has been done and therefore there is a reduction in closing balance of debtors and creditors is seen.

The provision for doubtful debts was created as on 31st March 2017. However the provision has not been deducted from debtors but maintained in the liability side. The provision is reduced based on collection received during the financial year from the party accounts covered under the provision.

Appendix – 11

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:
Pensions payments are accounted for April to March every year.

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

(C.S.MURALI KRISHNA)
Chief Accounts Officer

(V.S. NANDAKUMAR)
Director General

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

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

Place: Bangalore,
Date: 18-06-2019.

Appendix – 11

Schedule – 17

Notes on Accounts & Contingent Liability attached to and forming part of Accounts for the year ended 31st March 2019.

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.8.09 lakhs for 2018-19 (Rs.148.37 lakhs for the previous year) and Rs.1260.94 lakhs upto 2018-19.

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

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

   The total amount to be contributed by C.P.R.I. on account of above mentioned projects is Rs.110.20 Crores. To meet the above expenditures, C.P.R.I. has created a reserve by name "Reserve for Capital Expenditure out of CPRI generated funds" and the credit balance under this reserve as on 31-03-2019 is Rs.55.13 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.

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

Appendix – 11

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. 18.40 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 ₹ 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 31.03.2019 through M/s Trans Value Consultants (Actuaries and Financial Consultants) and the liability has been estimated at Rs. 63841.46.00 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.

As such Rs. 5184.73 lakhs was required to be provided. However considering steady decline of interest rates on investment, a sum of Rs.6800.00 lakhs has been charged to Income & Expenditure Account during the current year. The cash of Rs.6800.00 lakhs will be transferred to Superannuation Fund during the financial year 2019-20.

Appendix – 11

5. **Income Tax Cases :-**

(a) Institute was notified by the Government of India, Ministry of Finance, Department of Revenue vide Notification No.178/2007 (F.No.203/38/2006/ITA-II), dated 24.5.2007 in the category of 'other institution' partly engaged in research activities for the purpose of Clause (ii) of Sub Section (1) of section 35 of the Income Tax Act 1961 read with rules 5C & 5D of the Income Tax Rules, 1962 effective from 01.04.2005. The Income of the Institute was allowed as exempt from Income Tax under section 10(21) of the IT Act 1961 up to the Assessment year 2005-06. However, the Income Tax Department has re-opened the Assessment for the assessment years from 2001-02 to 2006-07 (Financial years 2000-01 to 2005-06) under section 143, 147& Sec 263 on the grounds that the exemption under Sec.10 (21) is available to Scientific Research Association notified as such under section 35(1)(ii) of the IT Act and not to "Institution"/ "other institution".

In view of the above, CPRI had filed writ petition (W.P. Nos. 50838 & 56636-56637/2013) on 11-11-2013 before H'onble High court of Karnataka for notifying CPRI as 'Scientific Research Institute" under section 35(1)(ii) of the Income tax act, 1961. Hon'ble High court disposed off the petition on 26.11.2014 by quashing the Notifications dated 30.01.2004 and 24.05.2007 and the clarification dated 28.08.2006 issued by CBDT. Further, the Hon'ble High Court directed CPRI to make a fresh representation before CBDT and explain the nature of activities carried out, which shall be taken into consideration by the CBDT while considering the claim of exemption.

The Institute had applied to CBDT on 09.04.2015 as per the directions of the Hon'ble High Court for recognition as a 'Scientific Research Association'. The CBDT vide Notification No.27/2017(F.No. 203/32/2015/ITA-II) dated 07-04-2017 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.

On receipt of above Notification, C.P.R.I. has applied for refund of TDS of Rs.5278.80 lakhs from Assessment Years 2003-2004 to 2017-2018.

Sl. No.	A.Y.	Issue and status of the of the cases as on 31.03.2018
1	2009-10 2010-11 2011-12	Appeal was filed with CIT (Appeals)-14 and the appeal was party allowed vide order dated 27.07.2016. The case is pending with Assessing Officer.
2	2012-13 2013-14	Appeal was filed with ITAT, "C" Bench and the appeal was party allowed vide order dated 13.10.2017. The case is pending with Assessing Officer
3	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
4	2017-18	The case has been taken up for Scrutiny and the documents are submitted as required by the CIT, Exemptions Circle-1 awaiting for orders from CIT, Exemptions Circle-1

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

Appendix – 11

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 24.4.14 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 Sadasivanagar Police Station on 20th Oct. 2016. The matter is still pending.

M.A. NARASIMHAN & Co Firm Reg. No. 0023475 Bangalore Chartered Accountants

Appendix – 11

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 2017-18).

b) Estimated amount of liability on account of capital contracts – Rs.5807.80 lakhs. (Rs.2,434.25 lakhs for 2017-18).

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. 358.68 lakhs for 2018-19 (Rs. 1079.49 lakhs for 2017-18), 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 31.03.2019 are Rs. 1909.57 lakhs (Rs. 2624.76 lakhs as on 31.03.2018).

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

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

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

(C.S.MURALI KRISHNA)
Chief Accounts Officer

(V.S. NANDAKUMAR)
Director General

(PARTHA NARAYAN)
Partner
Membership No.028994

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

Place: Bangalore,
Date: 18-06-2019.