

CPRI NEWS

Issue No: 147

January - June, 2019



CENTRAL POWER RESEARCH INSTITUTE

(Government of India Society, Ministry of Power)

Prof. Sir C V Raman Road, Sadashivanagar Post Office,

P B No. 8066, Bengaluru- 560080, India

Website : www.cpri.in

Contents

In the News	3
R&D Activities	4
Research News	5
Testing Services for Overseas Customers	5
New Test Facilities	6
Special Tests	6
Short Circuit Test Facilities	7
Participation in Exhibitions	8
Conference / Workshop / Training Programme / Seminars	9
Visit of Overseas / Important Customers	13
EVENTS	13
Research Papers Published / Presented	14
Accolades	17

In the News

❖ **New Unit at Nashik:** Shri R K Singh, Union Minister of State (IC) for Power and New & Renewable Energy, Government of India laid the foundation stone of new 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 Senior Officers of CPRI were present during the occasion.



Foundation Stone Laid by Shri R K Singh, Union Minister of State (IC)

❖ **CPRI Institute day:** The Institute Day 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. During the occasions Mylavarapu Subbalakshamma Award was presented to Smt. Sarita S Dongre, Joint Director, STDS-CPRI, Bhopal being for the best Lady Scientific/Engineering Officer towards most significant work done by her during the year 2018. This award is constituted by 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, December 2018 issue.

As part of the celebration 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.



Left to right : Dr. B Nageshwar Rao, Additional Director, CPRI, 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 during Institute Day Celebration

❖ **Study visit of Parliamentary Standing Committee on Energy:** 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.

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

❖ Director General-CPRI attended the Review Meeting taken by Additional Secretary, Ministry of Power (MoP) regarding functioning of NHPTL and consideration of proposed loan to NHPTL by promoters, held at MoP on 23 April 2019, New Delhi.

❖ Director General-CPRI & Shri B.A. Sawale, Additional Director, STDS-CPRI, Bhopal attended the meeting taken by Secretary (Power) regarding various issues relating to roll out of Smart Metering in India, held at MoP on 8th May 2019, New Delhi.

❖ Shri V S Nandakumar, Director General and Shri M K Wadhvani, Additional Director were deputed for 45th STL Management Committee meeting at Warawick, U.K 16 and 17 May 2019.

R&D Activities

1. MoU was entered with IIT, Roorkee on 1st January 2019 for the execution of the project titled "Design, Development and Validation of a New Adaptive Digital Relaying Scheme for Power Transformer". Under this project, it is proposed to design a new adaptive protection scheme for a power transformer having the capability for effective discrimination between internal faults and other external events and also to achieve enhanced relay performance during change in tap position of a transformer and other abnormalities. Other factors such as Current Transformer (CT) saturation during occurrence of a heavy through fault (outside the transformer, usually on the transmission line) will also be addressed.

2. MoU was entered with IIT, Kharagpur on 1st March 2019 for the execution of the project titled "Design and Development of 5m long single phase HTS cable". Under this project development and demonstration of a 5 m. long HTS cable (1000 A / 10 V DC & AC) with associated cryostat is planned.

3. MoU was entered with IIT Gandhinagar and IIT Kharagpur on 25th March 2019 for execution of projects on electricity based cooking under the RSOP Scheme with the ultimate aim to promote the use of electric cooking for the Indian Household.

4. MoU was entered with CSIR-CIMFR, Dhanbad on 25th February 2019 for execution of projects on "*Bio-processing of coal industrial effluent and coal fines recovery using aquatic plants and phototrophs*" under the RSOP Scheme. Under this project it is proposed to develop a process to treat the coal industrial effluents through aquatic plants before it is discharged.

5. A Lecture was organized on "Preparation and Characterization Of Polyaniline-Sr2timno6 Nanocomposites for Supercapacitors" by Miss Padmini, Project Associate, Dielectric Material Division on 14th February 2019 at Center for Collaborative and Advanced Research (CCAR), CPRI, Bengaluru.

6. A Lecture on "Multi-communication Technology based AMI for Smart Metering in India" by Dr Amit Jain, Joint Director, PSD was organized on 22nd March 2019 at Meeting Room, Head Office, CPRI, Bengaluru.

7. A Lecture on "Nickel Based Additive-Free Ultrathin Graphite Film for Fabrication of Flexible Symmetric Supercapacitor" by Miss Sneha, JRF, Electrical Appliances Technology Division was organized on 6th March 2019 at Meeting Room, Head Office, CPRI, Bengaluru.

8. The 6th Meeting of Technical Committee on Hydro Research of CPRI was held on 27th February 2019 at CCAR Meeting Room, CPRI, Bengaluru. The meeting was chaired by Dr. B K Gandhi, Professor, IIT, Roorkee. Members from CEA, NHPC, and SJVNL participated in the meeting. One (1) Completed and Six (6) New projects were evaluated by the Committee. Progress of five (5) Ongoing projects was also reviewed.

9. The 6th Meeting of Technical Committee on Transmission Research of CPRI was held on 5th and 6th March 2019 at CCAR Meeting Room, CPRI, Bengaluru. The meeting was chaired by Dr. S C Srivastava, Professor, IIT Kanpur. Members from CEA, POWERGRID and IEEMA participated in the meeting. Four (4)

Completed and Six (6) New projects were evaluated by the Committee. Progress of Sixteen (16) Ongoing projects was also reviewed.

10. The 7th Meeting of Technical Committee on Grid, Distribution and Energy Conservation Research of CPRI was held on 14th and 15th March 2019 at CCAR Meeting Room, CPRI, Bengaluru. The meeting was chaired by Dr. S V Kulkarni, Professor, IIT Bombay. Members from CEA and TANGEDCO participated in the meeting. Nine (9) Completed and Seventeen (17) New projects were evaluated by the Committee. Progress of Sixteen (16) Ongoing projects was also reviewed.

11. The 6th Meeting of Technical Committee on Thermal Research of CPRI was held on 20th March 2019 at CCAR Meeting Room, CPRI, Bengaluru. The meeting was chaired by Dr. R P Vedula, Professor, IIT Bombay, Members from CEA, BHEL and TATA Power participated in the meeting. Nine (9) Completed and Seven (7) New projects were evaluated by the Committee. Progress of Five (5) Ongoing projects was also reviewed.

12. A workshop on "HVDC Transmission systems- Recent Trends" was organized during 21st-23rd March 2019, at Dept of Electrical and Electronics Engineering, MS Ramaiah Institute of Technology, Bengaluru by Dr. Premila Manohar (Project Investigator of RSOP Project) for dissemination of knowhow generated from the RSOP project titled "Hybrid HVDC Systems for Multi Indeed Applications".

13. The 21st Meeting of Standing Committee on R&D (SCRD) of CPRI was held on 9th April 2019 at Conference Hall Manthan, Central Electricity Authority (CEA), New Delhi. The meeting was chaired by Shri. Prakash S Mhaske, Chairperson, CEA, New Delhi. The meeting was attended by DS (Finance), MoP, Members from CEA, BHEL, POWERGRID, NTPC-NETRA, DSIR and NHPC. Progress of ongoing and completed projects was reviewed. Evaluation of Six (06) new projects was carried out.

14. A Technical Paper titled "भारत में स्व च्छक्कगिप्रौद्योगकियिों पर अनुसन्धान की आवश्यकताओं का अवलोकन" authored by Shri. Arka Chakraborty, Shri R A Deshpande and Dr. Tulika Bhattacharjee was presented by Shri Arka Chakraborty, Engineering Officer Grade 2 at Annual Seminar in Hindi 2019 organized by NAL on 23rd May 2019.



6th meeting of Technical Committee on Transmission Research held on 5th & 6th March 2019

15. Shri. R A Deshpande, Additional Director, R&D M attended the meeting on review of projects approved under Uchhatar Avishkar Yojana (UAY) Phase-II held on 20th May 2019 under the Chairmanship of Additional Secretary (Technical Education), Department of Higher Education at Shashtri Bhawan, New Delhi.

16. Prof. Balarko Chaudhuri, Reader in Power systems, Imperial College, London and Prof. Tarlochan Sidhu, Professor & Chair, Department of Electrical and Computer Engineering, the University of Western Ontario have been nominated as CPRI Visiting Chair professor at IISc for the academic year 2019-20.

17. MoU was entered with IIT Roorkee (02), LPU, Punjab, IIT Kanpur, CSIR-CIMFR Dhanbad, IIT Guwahati, NIT Tirucharapalli and NIT Warangal in June 2019 for the execution of R&D Projects Under RSoP. Scheme. The R&D projects are related to topics such as study of unsteady aerodynamic response in LP turbine blade and its control under part load conditions, reconfiguration control for megawatt power electronic converters fed variable speed pumped storage units, development of thermoelectric power generator for clean energy generation, development of plasma torch for efficient disposal of municipal solid waste, development of efficient induction cooker suitable for vessels of different material and the like.

Research News

1. Final Viva-Voce Examination of Mr. Chandra Sekhar B, SRF, for Ph.D. (Engg.) by Research was conducted on 11th March, 2019 at CPRI, Bengaluru. His thesis titled "*Modeling, Analysis and Control of Multi-input Multi-output DC-DC Converter systems*" deals with design and control of integrated multi-input DC-DC converter system on DC loads with hardware prototype implemented on battery charging.

2. Final Viva-Voce Examination of Mr. Muhammed Farooque Khan, SRF, for Ph.D. (Engg.) by Research was conducted on 22nd March, 2019 at CPRI, Bengaluru. In his thesis titled "*A Reliable Optimal Smart Metering Infrastructure for Smart Grid*" an experimental architecture (*viz.* 6TRAITS) is proposed combining the power system components modeled in real-time power system simulator and IoT enabled smart metering field network

using hardware in the loop scenario-contributing towards an approach for large scale SMI deployment evaluations in a lab environment.

3. Twelve (12) research students (with details as follows) received their research degrees during the 18th Annual Convocation of VTU Belgaum held on 18th March 2019.

Ph.D.(Engg.): S Sudalai Shunmugam, S Daisy Flora, Vani Vijay, Vinoth Kumar N., Chandrasekhar B.

MSc.(Engg.): Likitha S, Pushpa Y.S., Yashodhara B., Atulya Mishra, Sudhakar H. S., Dundru Sridhar, Puneeth Bhurat.

4. Open Seminar / Doctoral Committee Examination was conducted for One (1) SRF and necessary suggestions were provided for effective thesis writing.

Testing Services for Overseas Customers

1. Short time withstand Strength test at 100kArms for one second with initial peak of 220kA as per Clause 10.11, 10.5 of IEC: 61439-1 and IEC: 61439-6, 2012 on 690V, 4000A Internal Earth Sandwich Bus way was carried out for M/s. Underwriters Laboratories, Middle East, Abu Dhabi, U.A.E. at STDS-CPRI, Bhopal

2. Short circuit withstand Strength test at 120kArms for one second with initial peak of 264kA on 1000V, 5000A Internal Earth Sandwich Busway as per Clause 10.11 of IEC: 61439-6, 2011 was carried out for M/s. Underwriters Laboratories(UL) Abu Dhabi, UAE, at STDS-CPRI, Bhopal

3. Impulse voltage withstand test was conducted on 250kVA, 11/0.433KV Distribution Transformer at STDS-CPRI, Bhopal for M/s. Adex Corporation Ltd., Dhaka, Bangladesh,

4. Short time current test on 11kV, 2500A NSPBD Busduct was carried out at High Power Laboratory, CPRI, Bengaluru for M/s. UL Middle East FZC, Dubai

5. Ability to withstand the dynamic effects of short circuit tests on 60/84/100 MVA, 220/55/55 kV Scott connected Traction Transformer for M/s. Meidensha Corporation, Japan, was carried out at High Power Laboratory, CPRI, Bengaluru

6. Seismic test on 415 V, 200 A Electrical Power Distribution Panel with stand mounted on triaxial shake table was carried out at Earthquake Engineering & Vibration Research Centre, CPRI, Bengaluru for M/s. Phoenix Mecano S.E. Asia pte. Ltd., Singapore

7. Seismic qualification test on 800 kV RIP Transformer Bushing and 420 kV RIP Transformer Bushing were carried out at Earthquake Engineering and Vibration Research Center, Bengaluru for M/s. Massa LLC (Izolyator Company), Russia.

8. Routine electrical tests were performed on 420 kV, 3000A condenser type resin impregnated AC Bushing at UHVRL, Hyderabad for M/s. Massa, LLC, Russia

9. Conditional short circuit tests at 36kA were carried out on 415V 250A, 415V 400A, 415V 800A & 415V 1000A Distribution Boards as per IEC 61439-1 & IEC 61439-2 was carried out at Short Circuit Lab, Bengaluru for M/s. Link Light Switchgear Industries LLC, Dubai, UAE.

10. Short-circuit & Temperature-rise tests were carried out on 5kVA 6350/240V Single Phase Distribution Transformer as per IEEE Std C57.12.90- 2015 & IEEE Std C57.12.00 – 2015 was carried out at Short Circuit Lab, Bengaluru for M/s. Energypac Engineering Ltd., Dhaka, Bangladesh.

New Test Facilities

❖ Pollution test on HVDC Composite Insulator Strings by Solid-layer method

UHV Research Laboratory, Hyderabad carried out Pollution test on ± 500 kV and ± 320 kV HVDC Composite Insulator strings of M/s. BHEL, EPD Bengaluru and M/s. Deccan Enterprises Ltd., Hyderabad respectively, by solid layer method for the first time during January 2019. The tests were carried out in general accordance with IEC 61245 at an average salt-deposit density of 0.1 mg/cm². The tests were witnessed by representative of M/s. Powergrid Corporation of India Ltd., Gurgaon.



± 500 kV HVDC Quadruple tension composite insulator string arranged for pollution test by solid layer method

❖ The Dielectric Materials Division (DMD) has taken the UNIDO sponsored project on "Management service for the treatment of Transformer oil containing PCBs using the Mobile PCB DE-chlorination system in India". Under this project, DMD received two units i.e Mobile PCB Dechlorination unit/plant and stationary Sodium Dispersion unit. After satisfactory commissioning and successful initial trial runs, for the first time, the mobile plant was taken to M/s. Vishweshwaraiah Iron & Steel Plant (VISL), Bhadravathi, Karnataka and dechlorinated 25 KL of various concentrations upto 360 ppm of PCB contaminated oil from 27th February 2019 to 22nd March 2019.

Mr. Surajit Mishra, General Manager - Maintenance, M/s. VISL, Bhadravathi was appreciated CPRI PCB team and expressed their happiness on successful completion of PCB contaminated oil of VISL, Bhadravathi.



PCB Dechlorination work at VISL, Bhadravathi, Karnataka

Special Tests



Dielectric test on truck mounted insulating boom

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

❖ 60/84/100 MVA, 220/55/55 kV Scott connected Traction Transformer of M/s. Prime Meiden Limited, Nellore, Andhra Pradesh was tested for Ability to withstand the dynamic effects of short circuit on 17th January 2019 at High Power Laboratory, CPRI Bengaluru.

Short Circuit Test Facilities

Short-Circuit Laboratory at CPRI, Bangalore is serving electrical industries and utilities by rendering its testing services for more than 40 years. It has state-of-the-art- facilities to conduct tests on Low Voltage Switchgears and Controlgears, Distribution Transformers, Instrument Transformers, Low Voltage Switchgear and Controlgear assemblies, HT Switchgears etc., CPRI is a Member of STL (Short Circuit Testing Liaison), accredited by M/s. Intertek (formerly known as ASTA) of UK. Short-Circuit Lab is also accredited by NABL & BIS at National level.

The laboratory is carrying out Short-Circuit test on Switchgear equipments like Distribution Transformers, Current Transformers, Potential Transformers, MCB, MCCB, RCCB, ACB, Fuses, Starter Modules, LT Panels (PCC/MCC), Distribution Boards, Feeder Pillars, LT & HT Bus-Ways, Underground Power Cables and its Accessories, Power Connectors, Isolators / Dis-connectors, Load Break Switches, Earth Electrodes, HT Panel Boards and many other power system apparatus.

Unique Test facilities

(i) The laboratory has 50 MVA Short-Circuit Motor-Generator set. By using this facility Short-time current tests up to 50kA rms for 1.0s and 30kA rms for 3s can be performed on various Switchgear equipment. Also laboratory is equipped with a DC test facility of 600V, 30kA for 3.0s which enables to carry out tests on DC rated switchgear equipments. Further Short-Circuit breaking capacity tests up to 50kArms 460V / 25kArms 800V can also be performed on LV Switchgear apparatus like MCCB, ACB, Switches etc.,

(ii) Temperature rise test facility on Distribution Transformers up to 33kV class & 2.5MVA rating.

(iii) Electrical endurance test on LV Switchgear apparatus up to 2500A at 440V and up to 400A at 690V.

(iv) Accuracy test & routine tests on Current Transformers up to 765kV class , 6000A and Potential Transformers up to 66kV class.

(v) Dedicated sound proof room for conducting sound level measurement test on Distribution Transformers. Sound Proof Room for conducting noise level test on Distribution Transformer 50MVA, 12kV Short Circuit Generator

(vi) Environment test facilities like Dry heat / Damp heat cycle test, Glow wire test, Ball pressure test

(vii) Lifting & mechanical impact test on Panels & Distribution Boards

(viii) Impulse Test facility up to 30kV for LV equipment.

(ix) High voltage power frequency tests up to 100kV AC for 1 min and induced over-voltage tests up to 1000 V and up to 200Hz.

(x) Surge Immunity test facility for RCCB , Ring wave test facility up to 200 A and combination wave generator having open circuit voltage wave shape of 1.2 /50 μ s and short circuit current wave shape of 8/20 μ s up to 3000 A.

(xi) Short Circuit Lab is accredited by INMETRO, Brazil for Inmetro labeling program. Test facilities are available for conducting the routine & type tests on Distribution Transformer as per NBR 5440 standard.



Short-Circuit Test Bays

Temperature Rise Test on Panels using Feeder Loading Unit

The latest IEC 61439 calls for more no. of tests in order to verify the assembly completely for temperature rise verification. Hence not only main & distribution bus-bars but outgoing feeders are also need to be checked for verifying the diversity factor when all the feeders are loaded simultaneously. This calls for using more multiple feeding source to simulate the actual service condition. The facility has been enhanced to next level by installing feeder loading units consisting of 10 different units. It allows arranging different currents in different feeders of switchboard permitting 100% actual simulation. Feeder loading unit consists of number of independent 3 phase current sources.

Each 3- phase source has 3 single-phase variacs one for each phase to adjust the current, 3 CTs in line with rating of feeder, an ammeter & ammeter selector switch. Test voltage required is usually 3-4V per phase.

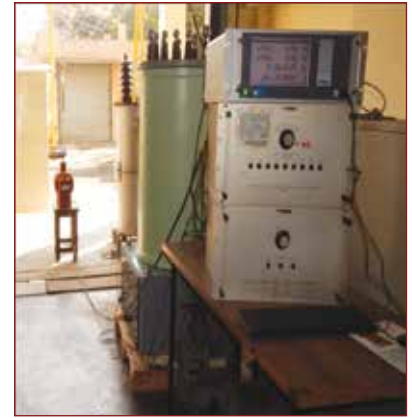
Feeder loading unit is more flexible in balancing the current phase wise through current injection method. The current can be adjusted according to Rated Diversity Factor for the individual functional units of the assembly under test.

New Test Facilities Added at Short Circuit Laboratory

Short Circuit Lab, CPRI, Bengaluru has upgraded Accuracy Test facility on Potential Transformer as per National and International Standards. Standard Potential Transformer of rating 66 kV with primary tap of 3.3- 6.6- 7.2 – 11 – 12- 13.8 – 15 – 22 – 24 – 33- 66 kV and secondary voltage of 190-110-110/V₃-110/3 V has been added. Hence, The Accuracy Test on Potential Transformer upto 66kV can be tested. Accuracy Test on Current Transformer also has been upgraded upto 765 kV, 8000A CT.



Smart Meter under Load Switching Capability test



22kV / V₃ PT under Accuracy test

Test facility has been created to conduct Influence of Short time over current and Load Switching capability test, Fault current making capacity test, Short circuit current Carrying capacity, minimum switched current etc., on Smart Meters and Pre-payment meter as per National and International standards. The tests on Smart Meter of UC1, UC2 categories have been successfully tested.

Participation in Exhibitions

❖ 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 its 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.



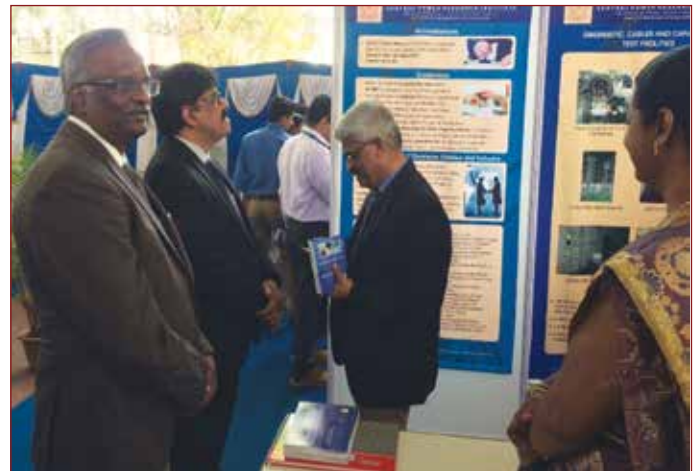
Director, MoP visits CPRI Stall

❖ CABLETECH 2019

The Institute organized an International Conference on Power Cable Technology - "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, Consultants/Field testing and Training activities of the Institute. Many delegates showed keen interest and enquired about the various unique facilities of CPRI.



Shri Shashi Amin, Chairman – Cables Division, IEEMA and Director General, CPRI interacting at Stall

❖ Grid Tech 2019 Exhibition

Central Power Research Institute (CPRI) participated in GRIDTECH – 2019 Exhibition organised at Pragati Maidan, New Delhi, from 3rd to 5th April 2019. Dr. K.T.Varughese, Additional Director, CPRI, Bengaluru and Sri M.K.Jaiswal, Joint Director, RTL-CPRI, Noida, and Sri Ramadas, Engg. Officer, Information & Publicity Division, CPRI, Bengaluru participated in the exhibition. CPRI stamped its presence by setting up a stall and promoted CPRI services at the exhibition. Footfalls to CPRI stall were more than 200 Visitors / Customers.



CPRI officials along with visitors at CPRI Stall

❖ 8th ELASIA-2019

International Exhibition on Power, Electrical, Controls & Lighting was held at Bengaluru International Exhibition Centre (BIEC), Bengaluru, from 21st to 24th June 2019.

CPRI participated in the Exhibition and displayed its Credentials, Research, Testing facilities, Consultancy and Training activities. The CPRI Stall witnessed many visitors from Industry, Research Organizations, Government Utilities, Academia who interacted with CPRI Officers and showed interest in CPRI services



CPRI officials along with visitors at CPRI Stall, Elasia - 2019

Conference / Workshop / Training Programme / Seminars

❖ Cables and Diagnostics Division, CPRI, Bengaluru organized 10th International Conference on Power Cables “CABLETECH 2019” during 27th and 28th February 2019. Around 160 delegates from various Utilities, Manufacturers & academic Institutions participated in the International Conference. This includes about twenty foreign delegates participation from various countries like Germany, UK, Italy, Jeddah, Korea, Switzerland, Dubai, Egypt, Oman and China.

The Conference was inaugurated by Shri. V.S.Nandakumar, Director General, CPRI, Bengaluru and Shri. Shashi Amin, Chairman, Cable Division (IEEMA).

The conference constituted of seven technical sessions on various topics such as HVDC Cables, Material Evaluation, Cable Diagnostics, Cryogenics/Super Conductivity/Innovation, Installation & maintenance Practices, Cable Accessories & Fire Assessment and thirty six technical papers were presented by authors. In connection with the conference, invited talks were delivered by eminent personalities Prof. Huw Griffiths, Khalid University, Abu Dhabi and Prof. T.S.Datta, Inter University Accelerator Centre, Cryogenics and Applied Superconductivity on latest developments in power cable technology.



Inauguration of the Exhibition of International Conference CABLETECH 2019

❖ Metering Utility Automation Division Organized One day “Workshop on Prepaid Energy Meter Testing Methodologies” held on 11th Jan. 2019 at CCAR, CPRI Bengaluru. The main objective of the Workshop was exposure and awareness to various aspects of standards and to disseminate aspects related to testing of Prepaid Energy meters to Utilities & Manufacturers. FortyOne (41) delegates representing BESCO, MESCOM, KSEBL, NBPDC, SBPDC, ECIL, ITI Ltd., CDAC, Meter manufacturers, etc participated in the Workshop.



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

❖ Metering Utility Automation Division Organized Two days "Workshop on Smart Power and Automation" held on 17-18 January 2019 at CCAR. The non-residential workshop is meant to disseminate the knowledge and experience in recent technologies being used and available for the Smart Power Grid applications. The programme consist of lectures by experts followed by demonstrations and visit to the test laboratories. The aim of the workshop was to highlight the key role played by standards, recent developments in technology and field experiences.

The topics for this workshop included:

- Smart Grid Technologies
- Standards related to Smart Grid
- Cyber Security for Power Systems
- Substation Automation Systems
- Communication Architecture
- AMI and smart meters
- IoT for Smart Grid applications
- Utility's experience
- Power System Automation
- Laboratory visits



Two days "Workshop on Smart Power and Automation" held at CCAR, Bengaluru during 17 – 18 January, 2019.

❖ Metering Utility Automation Division Organized One day National Seminar on "Smart Grid, Smart Meter and Communication Technologies" was conducted on 25th February 2019. Accurate measurement of energy are becoming extremely important both for the consumers and service providers at all levels of modern power systems. Under smart grid programme, Advanced Metering Infrastructure (AMI) is a key layer which includes several concepts and components. The AMI will have smart meters, data concentrator units (DCUs), HAN etc. The smart meter is a vital component and would provide enormous data for optimum utilisation of energy. Effective communication network is the key for success of smart metering. All utilities are looking forward for the implementation of Smart Meters at consumer premises and monitor energy consumption remotely.

This seminar was organized to benefit of all stake holders with the aim of sharing the emerging trends in smart grid technologies and communication aspects through presentations & interaction to share the knowledge and experience in the field of smart grid and smart metering.



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

❖ Training Division organized three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL) Kolkata (Batch-35) from 14th January to 2nd February 2019. 24 Engineers participated in the Training Programme.

The Training Programme mainly discussed about the important aspects of Electricity Distribution such as Protection System, Relays, Cables & Capacitors, Energy Metering, Electricity Act, Maintenance of Substation, Billing, Reduction of Technical Losses and Commercial Losses, Loss Precaution, Power System Management, SCADA System, Distribution Network, Reactive Power Compensation, Voltage Improvement, Faults, Earthing System, etc.,

The training programme was devised to comprehensively address various aspects of Electrical Distribution for the newly inducted Engineers.



Group photo of WBSEDCL Engineers (B-35)

❖ Training Division organized Three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL) Kolkata (Batch-36) from 18th February to 9th March 2019. Twenty Seven Engineers participated in the Training Programme.

❖ Five days Residential Training Programme on “Testing of Electrical Equipment” for Engineers of NHPC Limited (Batch-1) was conducted during 04 – 08 February, 2019. Eighteen Engineers participated in the Training Programme.



Group photo of NHPC Limited Engineers (B-1)

❖ Five days Residential Training Programme on “Testing of Electrical Equipment” for Engineers of NHPC Limited (Batch-2) was conducted during 11-15 March, 2019. Twenty Two Engineers participated in the Training Programme.



Group photo of NHPC Limited Engineers (B-2)

❖ Three days Residential Training Programme on “Smart Grid Technologies” for Engineers from various utilities was jointly conducted by CPRI and NSGM during 22-24 May, 2019. Twenty Five Engineers participated in the Training Programme.



NSGM Training Programme on “Smart Grid Technologies”

❖ Three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL) Kolkata (Batch-37) was conducted during 03-22 June 2019. Twenty Three Engineers participated in the Training Programme.

The Induction Training Programme for M/s. WBSEDCL engineers was designed to give an impetus to the engineers to get exposed to the domain of Distribution Engineering.

❖ Regional Testing Laboratory (RTL) Guwahati organized a one day Tutorial program on 'Preventive Maintenance of Transformers by Transformer Oil Analysis and DGA' on 19th July 2019 at Guwahati. The program was inaugurated by Shri Sanjay V Malpe, Principal Director, NPTI in presence Dr. Prabhat Kumar Maiti, Joint Director & Unit Head RTL, Guwahati & Kolkatta, Shri Lohit Das, Director, Training Institute, APDCL. Total Twenty Nine participants from various organizations viz. APDCL, APGCL, PGCL, OIL, IOCL, IIT Guwahati, Hindustan Unilever, NPII and few Private Companies participated in the tutorial program. Lectures on various aspects of transformer oil tests, their significance and condition monitoring of power transformer were delivered.



Group Photo of Participants

Shri Manab Jyoti Saikia, Retd. CGM, AEGCL and a well-known engineer was invited as a guest speaker to deliver a talk on Transformer Diagnostic tests. Various tests of transformer oil were demonstrated to the participants at the laboratory. Participation certificates were distributed in the valedictory function.

❖ Thermal Research Center, Nagpur Organized a one day training programme on "Welding heat treatment" during 24th May 2019. Welding plays an important role in ensuring availability of plant components with assured safety. Running the existing aged power plants with optimum availability and plant load factor (PLF) is an option to meet the challenge of ever increasing demand for electricity. Asset management of the critical systems of thermal power station namely boiler and turbine ensures improved availability with the additional assurance of its fitness for the purposes.

Thermal Research Centre (TRC), Nagpur conducted the said programme with an objective is to familiarize the plant Operating & Maintenance Engineers with basic concept of various types of welding processes, welding of plant components, welding defects and heat treatment, quality check of weld by various NDT techniques. The recommendation based on the findings helps the plant authorities to take appropriate engineering decision with respect to run/repair/refurbish/replace of the plant components and operate with improved efficiency.

❖ Thermal Research Center, Nagpur Organized one day training programme on "RLA of Boiler" during 30th April 2019. Running the existing aged power plants with optimum availability and plant load factor (PLF) is an option to meet the challenge of ever increasing demand for electricity. Asset management of the critical systems of thermal power station namely boiler and turbine ensures improved availability with the additional assurance of its fitness for the purposes. Improvement in efficiency reduces the cost of power generation.

Thermal Research Centre (TRC), Nagpur conducted the said programme with an objective is to familiarize the plant Operating & Maintenance Engineers with basic concept of RLA and its methodologies, various types of damage mechanisms prevailing in boiler & turbine, Non-destructive Evaluation (NDE) based assessment of this damages and their prevention, measures to reduce energy losses by adopting proper operating and maintenance practices. The recommendation based on the findings helps the plant authorities to take appropriate engineering decision with respect to run/repair/refurbish/replace of the plant components and operate with improved efficiency.

The programme covered the following:

- Philosophy of Remnant Life Analysis (RLA)- an Introduction
- Methodologies for RLA of Boiler
- High Temperature Damage Mechanism and Failure Analysis of Boiler components



One day training programme on "Welding heat treatment" during 24th May 2019.



one day training programme on "RLA of Boiler" during 30th April 2019.

Visit of Overseas / Important Customers

1. Mr. Md. Mosaddequl Islam from M/s. Electronic Engineering Ltd., Dhaka, 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 of M/s. Electronic Engineering Ltd., Dhaka, Bangladesh, on 19th & 20th February 2019.
2. Mr. Jay Kumar Sah M/s. Nepal Electricity Authority, visited CPRI, Mr. Fan Huiping & Mr. Xu Pan M/s. ETERN-CCCE-FEPEC JV, China visited CPRI for witnessing the testing of 132kV D/C Type "DC" Tower Mechanical Engineering Division, CPRI, Bengaluru 4th & 5th March 2019.
3. Mr. Thark Bahadur Thapa M/s. Nepal Electricity Authority Mr. Fan Huiping & Mr. Xu Pan M/s. ETERN-CCCE-FEPEC JV, China visited CPRI for witnessing the testing of 132kV D/C Type "DD" Tower Mechanical Engineering Division, CPRI, Bengaluru 11th & 12th March 2019.
4. Mr. Mohammad Said Minkara, Engineering & Business Support Director M/s. Energya Power Cables (EPC), Cairo, Egypt visited CPRI for witnessing the Short circuit test at 31.5kA for 1.0s being 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. Energy Power Cables (EPC), Cairo, Egypt at Short Circuit Laboratory, CPRI, Bengaluru 1st March 2019.

EVENTS

- ❖ CPRI, Bengaluru & its Units celebrated 70th Republic Day, on 26th January 2019. Shri V.S. Nandakumar, Director General - CPRI unfurled the National Flag at CPRI, Bengaluru.

CPRI won the prize under 6 categories of best maintained garden and horticulture being organized by the Mysore Horticulture Society, Lalbagh (as a part of Republic Day 2019).



Flag hoisting by Director General

- ❖ The National Safety Week (during 4th to 10th March 2019) commenced by administering pledge by the employees of Head Office and Units on 4th March 2019. During the week programmes like Mock Fire Safety Drill, just a Minute talk competition, Screening of Safety films to the employees and a Guest Lecture was organized.



Mock Fire Safety Drill

- ❖ CPRI Celebrated "129th Birth Anniversary of Dr. B.R.Ambedkar" on 14th April 2019 at Bengaluru, UHVRL, Hyderabad, STDS Bhopal and Other units of CPRI

- ❖ CPRI Celebrated the Swatchhta Pachwada on 16th-31th May 2019 at Bengaluru, UHVRL Hyderabad, STDS Bhopal, and other units



Swatchhta Pachwada at CPRI Residential Colony, Bengaluru

- ❖ CPRI Organized and Celebrated the 5th International Yoga day on 21st June 2019 at Bengaluru, Bhopal and Other units of CPRI



Yoga Day Celebration at CPRI, Bengaluru

Research Papers Published / Presented

CPRI has published Technical Papers on the following topics during Jan- Jun 2019

Sl. No.	Topic / Title	Authors	Presented/Published in Conference/ Journal
1.	Cooling systems- Recent Trends	N. Rajkumar	Cooling India Magazine, of January 2019
2.	Power Quality Study of 1500MVA Motor-less Short Circuit Alternator	Dr. A.K. Datta N.R. Mondal J. Santhosh	Technoarete International Conference on Emerging Trends in Electronics, Electrical and Mechanical Engineering, held at New Delhi, on 27 th January 2019
3.	Influence of Short-Time Over Currents and Load Switching Capability of Pre-payment Meters as per IS 15884 Standard	S. Arjuna Rao G. Girija	Published in One day Workshop on "Prepaid Energy Meter Testing Methodologies" held at CPRI, Bengaluru, organised by Metering & Utility Automation Division, CPRI, Bengaluru, on 11 th January 2019
4.	A Recommended Cascaded Structure for Multilevel Inverter with Minimum Power Electronic Components	N. Vinothkumar V. Kumar Chinnaiyan M. Pradish S. Prabhakar Karthikeyan	Published in 'Electric Power Components and Systems' Taylor & Francis Journal, January 2019
5.	Type of failure during short circuit withstand test of Multi Winding Inverter-Duty transformer for Solar Application- A case study, in International Conference on Modern Technology Trends in Power transformers including OLTC, bushing etc.,	Yugal Agrawal Manohar Singh Takkher M.K. Wadhvani J. Santhosh	CBIP & CIGRE India, New Delhi, on 27 th & 28 th February 2019
6.	Synthetic Ester Oil Based High Permittivity CaCu ₃ Ti ₄ O ₁₂ (CCTO) Nanofluids an Alternative Insulating Medium for Power Transformer	Dr. P. Thomas Nandini E. Hudedmani	IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 26, Issue No. 1, February 2019.
7.	Effect on dielectric, structural and thermal behaviour of CaCu ₃ Ti ₄ O ₁₂ in a Nylon 11 matrix	R. S. Ernest Ravindran Dr. P. Thomas S. Renganathan	Bull. Mater. Sci. (2019) 42:28, 1 st February 2019.
8.	Condition assessment of composite insulators removed from service, in International Conference on Emerging Trends in Engineering (ICETE 2019)	Sravanthi Boinala K. A. Aravind Dr. Pradeep M. Nirgude M. Manjula V. Kamaraju	University College of Engineering, Osmania University, Hyderabad, on 22 nd & 23 rd March 2019.
9.	Nickel based additive-free ultrathin graphite film for fabrication of flexible symmetric supercapacitor, in International Conference on Supercapacitors and Energy Storage Applications, ICSEA-2019	Kuldeep Singh Rana R. Sneha Shivangi Kosta	Center for Materials for Electronics Technology Thrissur, from 8 th to 10 th March 2019.
10.	Preparation and Characterization of PANI/STMO nanocomposite for supercapacitor application at the International Conference on Supercapacitors and Energy Storage Applications (ICSEA-2019)	M. Padmini P. Thomas	Centre for Materials for Electronics Technology, held at CMET, Thrissur, from 8 th to 10 th March 2019.

Sl. No.	Topic / Title	Authors	Presented/Published in Conference/ Journal
11.	Multi-communication technology based AMI for smart metering in India”, IEEE-2019 5 th International Conference for Convergence in Technology,	Amit Jain	IEEE, Bombay Section, held at Pune, from 29 th to 31 st March 2019.
12.	Design methodology of a small cooling tower	S. Jothibas	Cooling India Magazine in the March 2019 issue.
13	Adding solar power for net energy zero building	K. Jeykishan Kumar	International Journal of Scientific & Engineering Research, Volume 10, Issue 3, March-2019, pp 1376-1379, ISSN 2229-5518. Impact factor: 4.4
14	Voltage Current Time Inverse Based Protection Coordination of Photovoltaics Power Systems	Manohar Singh Anubha Agarwal	IET, Generation Transmission & distribution. Volume 13, Issue 6, 26 March 2019, p. no.794 – 804
15	Data-Mining Model Based Fault Location Scheme for Cross-Country Faults in Dual-Circuit Transmission Line Using Bagged Regression Tree Approach”, Springer’s International Conference on Machine Learning, Image Processing, Network Security and Data Sciences (MIND-2019),	V.Ashok Anamika Yadav	National Institute of Technology, Kurukshetra, on 3 rd & 4 th March 2019.
16	Energy Integration in South Asia: A Status Review”, at 1 st IEEE International Conference on Sustainable Energy Technologies and Systems (ICSETS) 2019	Tulika Bhattacharjee R. A. Deshpande Arka Chakraborty	Bhubaneshwar, from 27 th February to 1 st March, 2019
17	An Algorithm for Microgrid Protection using Z- Bus matrix formulation in a Central Master Controller	V. Vinod U. Jayachandra Shenoy	IEEE 5 th International Conference for Convergence in Technology (I2CT -2019), held at Pune, from 29 th to 31 st March 2019
18	Unified Grid Integration Algorithm for Synchronization and Power Control of Doubly-Fed Induction Generator”, at 2019 IEEE Applied Power Electronics Conference and Exposition (APEC)	R. R. Nair G. Narayanan	Anaheim, C.A., on 21 st March 2019.
19	Performance analysis of epoxy nano composites due to water droplet-initiated discharges under AC and DC voltages and localization of discharges, in IET Science, Measurement and Technology,	P. Mishra B. M. Ashwin Desai R. Sarathi T. Imai (2018)	(Online) doi.org/10.1049/iet-smt.2018.5056, March 2019
20	Dielectric properties of nylon 11/ CaCu ₃ Ti ₄ O ₁₂ (CCTO) nano composite films with high permittivity	P. Thomas, A. Ashokbabu, R. S. E. Ravindran R. Vaish	IEEE Transactions on Dielectrics and Electrical Insulation, Vol. No.26, No. 2, pp. 568-575.

Sl. No.	Topic / Title	Authors	Presented/Published in Conference/Journal
21	Small Signal Stability Assessment of Weak Inertia Systems.	Feba Alias & Dr Manohar Singh	Gridtech 2019 International Conference, organised by PGCIL and CBIP, Delhi.
22	Solid state transformers: An overview of applications and challenges.	S. Sudhakara Reddy Anupam Awasthi T. Gurudev Maroti S. Arun Kumar V. Sreeram Rajkumar,	CIGRE International Conference on Grid Integration of Renewables, held at New Delhi
23	Evaluation of Energy Efficiency Measurements on Home Appliances –Case Studies,	Dr P. Chandra Sekhar, D. Venkatesh	GRIDTECH-2019 International Conference-I, held at, New Delhi
24	Low density polyethylene-clay nano dielectric prepared by melt extrusion process: dielectric and thermal properties	B. Nageshwar Rao,	12 th International Conference on Electrical Materials and Power Equipment -ICEMPE 2019”, held at Guangzhon, China.
25	Effects of secondary grade core material on the performance of transformers and methods of detection	K. Karunakara, Ashitha P.N. K.G. Rakesh	GRIDTECH-2019 International Conference-I, held at, New Delhi,
26	Influence Of Metal Oxide Nano Particles on the Dielectric Response Of HVDC Cable Nano Dielectric.	B. Nageshwar Rao, R. Kandiban, Ashwin Parthasarathy	37 th Electrical Insulation Conference (EIC- 2018), held at Calgary, Canada
27	Opto Electronic Technique for Detection of Corona Discharges in Compressed Gases and Oil	B. Nageshwar Rao, Dileep Kumar Puhan, Rajat Sharma	37 th Electrical Insulation Conference (EIC- 2018) held at Calgary, Canada
38	Comparative Study on LLDPE, LDPE Nano Dielectric for application in HVDC cables: Dielectric response, Electrical and Thermal properties	B. Nageshwar Rao,	10 th International Conference on Insulated Power Cables, JICABLE-19, held at Paris Versailles, France,
29	A Study of Smoke Release of Complete Cables and components of the cables	R. Arunjothi T. Thirumurthy K.P. Meena	10 th International Conference on Insulated Power Cables, JICABLE-19, held at Paris Versailles, France
30	Effect of air density factors on performance of EHV cable terminations during lightning transients	K.P. Meena T. Thirumurthy R. Arunjothi	10 th International Conference on Insulated Power Cables, JICABLE-19, held at Paris Versailles, France,
31	Standardization of sample preparation for mechanical tests on cable Insulation and sheathing materials	P.V. Satheeshkumar G.K. Raja K.P. Meena	10 th International Conference on Insulated Power Cables, JICABLE-19, held at Paris Versailles, France
32	Thermal and Dielectric Properties of Processed Mahuva oil	Ann Pamla Cruze K.S. Lokesh Kaggare	20 th IEEE International Conference on Dielectric Liquids, held at Roma, Italy
33	Evaluation of Distribution Transformers through testing and analysis-An executive summary w.r.t commencement of IS1180:2014 standard	N. Maheswara Rao B. R. Vasudevamurthy G. Girija Somala Arjuna Rao Swaraj Kumar Das R. A. Deshpande	Conference on “Efficient and Reliable DTs for Sustainable Development”, held at India Habitat Centre, New Delhi, organised by IEEMA,

Accolades

❖ Mylavrapu 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 former Director General Dr. M. Ramamurthy, for the best Lady Scientist of the year and Awarded during CPRI institute day on 16 January 2019 at CPRI, Bengaluru



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

❖ 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 on 16 January 2019, 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, December 2018 issue, during CPRI institute day.



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

❖ 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. Shridhar, Chief Administrative Officer on 4th January, 2019 during the second meeting of TOLIC held at General Post Office, Bengaluru.



Chief Administrative Officer receiving the TOLIC Raj Bhasha Award

❖ Smt. L.N. Vidya, Sr. Hindi Translator was given a Certificate for her excellent contributions in getting First Prize by CPRI for its outstanding performance in the implementation of Official Language Policy of the Union during the year 2017- 18.



Smt. L.N. Vidya Receiving the Certificate from Chairman, TOLIC



Six Decades of Dedicated Service To Power Sector



- RESEARCH
- TESTING & CERTIFICATION
- CONSULTANCY
- TRAINING

Products tested at CPRI

- Distribution and Power Transformers • Switchgears
- Control Panels • Insulators & Isolators
- Energy meters & Smart Meters • Capacitors
- Transmission Line towers • Cables and Conductors
- Lighting Arrestors • Motors and Invertors
- Transformer Oil • Refrigerators and Air conditioners
- LED Solar Panels • Solar Pumps
- ...Many others electrical equipments.



CPRI_MOP CPRI_MoP

Head Quarters:Bangalore

CPRI Units:Bhopal,Hyderabad,Noida,Nagpur,Kolkata

Your Trusted Partner in Research and Testing in Power Sector



केन्द्रीय विद्युत अनुसंधान संस्थान
CENTRAL POWER RESEARCH INSTITUTE

(Autonomous Society Under Ministry of Power Govt of India)
Prof. Sri C.V. Raman Road, Satashivanagar PO, PB No. 8066,
Bangalore - 560030, Karnataka, India.
Tel:-91 80 22072200, 22072203, 22072208; Fax:-91 80 23688203
Email: dir@cpri.res.in / cpri.res.in / ramdas@cpri.in / ramdas@cpri.in
Website: www.cpri.in