CPRI NEWS

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Contents

In the News

❖ Annual Customer Meet 2019

CPRI Annual Customer Meet-2019 was held at Gokulam Grand Hotel & Spa, Bengaluru, on 13th September 2019. A total of 69 Senior representatives from Industry and Utilities attended the Meet.

Shri V.S.Nandakumar, Director General, CPRI in his opening remarks informed Customers about the recent developments and future plans of CPRI. Dr. K.T. Varughese, Additional Director, Information & Publicity Division, CPRI, Bengaluru presented the Action Taken Report on the suggestions of the Customers made during the previous Customer Meet 2018 held at CPRI, Bengaluru.

Opening Remarks by Director General, CPRI

Presentations on new facilities recently added by the Institute were made during the Meet which covered:

- Creep Test Facility.
- Upgradation of CT-PT Test Facility.
- Centre of Excellence for Non Destructive Testing (NDT).
- New Test Facility at UHVRL, Hyderabad.
- Test facility for LED Lighting and Solar PV Modules
- Motor Test facility.

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

On conclusion of the Open House, the Valued Customer Awards were presented to the Customers of CPRI for the year 2018-19 in the following categories

- Sponsored Research & Development Category:
  - United Nations Industrial Development Organization, Austria
- Emerging Customer Category:
  - Alliance Panels & Switchgears Pvt. Ltd., Mumbai
- Customized Training Category:
  - West Bengal State Electricity Distribution Company Limited. Kolkata
- Field Testing and Consultancy Category:
  - NLC India Limited, Neyveli
- Testing and Certification Category - Overseas Customer:
  - Meidensha Corporation, Japan
  - Energypac Engineering Limited, Bangladesh
  - Confidence Electric Limited, Bangladesh
- Testing and Certification Category- Indian Customer:
  - Bharat Heavy Electricals Limited, New Delhi
  - CG Power and Industrial Solutions Limited, Mumbai
  - Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Hyderabad
- Testing and Certification Category - Best State Utility:
  - Madhya Pradesh Madhya Kshetra Vidyut Vitaran Co. Ltd, Bhopal
  - Chhattisgarh State Power Distribution Company Limited, Raipur
  - Tamil Nadu Generation and Distribution Corporation Limited, Chennai

This year, CPRI introduced Valued Customer Award for "Best State Utility" under the Category of Testing & Certification.

❖ Celebration of Dr.B.R.Ambedkar Jayanthi

A function was organized to commemorate the 128th Birth Anniversary of Bharat Ratna Dr B.R. Ambedkar at CPRI, Bengaluru, on 19th July 2019. Shri Ashok N. Chalawadi, Joint Director, Department of Kannada and Culture, Govt. of Karnataka was the Chief Guest and the function was presided by Shri V.S. Nandakumar, Director General, CPRI.

Elocution Competition on "The role of Bharat Ratna Dr. Ambedkar in Social change" was arranged on 18th July 2019 as part of Birthday Celebrations. On this august occasion, Management of CPRI distributed the prizes for the winners of Elocution Competition and meritorious awards to the children of CPRI employees who excelled in 10th and 12th standards. Cultural program "Katha Keerthana on Dr. B. R. Ambedkar" by Dr. Lakshman Das from Kendra Sangeetha Nataka Academy was also organised.

128th Birth Anniversary of Bharat Ratna Dr B.R. Ambedkar

Research News

1. Local Inquiry Committee (LIC) members from VTU Belgaum visited CPRI on 16th July 2019 for inspection of Lab, Infrastructure, Library, etc in connection with continuation of VTU Research Centre at CPRI for the Electrical, Mechanical and Civil Engineering branches for the academic year 2019-20.

2. Open Seminar / Doctoral Committee Examination was conducted for six SRFs and necessary suggestions were provided for effective thesis writing during the July – September 2019. Pre-Ph.D Comprehensive Viva-Voce Examinations, for confirmation of registration to Ph.D. Programme, was also conducted for one SRF during this period.

A prototype of chip on board LED package

3 Dr. Chetan J. Panchal, Associate Professor, M S University Baroda, who is the Principal investigator of the RSOP project on "Development of Blue Light Emitting Diode Packages", visited R&D Management division, CPRI on 27th November, 2019 to discuss regarding the progress of the project. He demonstrated the chip on board LED package developed under the project.

4. MoU was entered with IIT, Bhubaneshwar in July, 2019 for the execution of R&D Project titled "Design and development of tools for detection and prevention of cyber-attacks in Smart Grid Energy Management Systems (EMS)" under RSoP Scheme. Under this project it is proposed to develop an automated cyber security analytics tool for Smart Grid Energy Management Systems for automatic detection of common and existing cyber security attacks in power grid Energy Management Systems (EMS) and Substation Automation Systems.

Testing Services for Overseas Customers

1. Seismic qualification of 12 kV Switchgear unit with VCB and 7.2 kV Switchgear unit with Vacuum contactor was carried out for M/s. AL – AHLEIA Switchgear Co. K.S.C.C, Kuwait.

2. Seismic test on 415V AC, 3 phase + Neutral Prisma-iPM Low Voltage Panel mounted on tri-axial shake table carried out at Earthquake Engineering & Vibration Research Centre, CPRI, Bengaluru for M/s. Schneider Electric Industries SAS, France

3 Short-circuit & Temperature-rise tests were carried out on 100kVA 11000/415V & 200kVA 11000/415V Three Phase Distribution Transformer as per IEC 60076- 5 : 2006 & IEC 60076 - 2 : 2011 standards during 10 - 13 December 2019 carried out at Short Circuit Lab for M/s. System Engineering Ltd., Gazipur, Bangladesh. Mr. Nazmul Hasan Mafuz, Sr. Engineer & Mr. Lakshman Kumar, Executive from M/s. System Engineering Ltd., Bangladesh witnessed the test.

4 Short-circuit & Temperature-rise tests were carried out on 200kVA 11000/415 & 250kVA 11000/415V Three Phase Distribution Transformers as per IEC 60076 - 5 : 2006 & IEC 60076 - 2 : 2011 standards during 12th- 15th November 2019 carried out at Short Circuit Lab for M/s. Energypac Engineering Ltd., Tejgaon I/A, Bangladesh. Mr. Abdullah Al Mamun, Senior Engineer & Mr. T Selvanathan, Assistant Engineer from M/s. Energypac Engineering Ltd., Bangladesh witnessed the test.

5 Short-circuit test was carried out on 200kVA 11000/415V Three Phase Distribution Transformer as per IEC 60076- 5 : 2006 standard on 1st & 8th November 2019 carried out at Short Circuit Lab for M/s. JRC Powertech, Dhaka, Savar, Bangladesh. Mr. Md. Biplob Hossainl, Manager from M/s. JRC Powertech, Bangladesh witnessed the test.

6 Short-circuit & Temperature-rise tests were carried out on 200kVA 11000/415V Three Phase Distribution Transformer as per IEC 60076- 5 : 2006 &IEC 60076- 2 : 2011 standards during 14th - 18th November 2019 carried out at Short Circuit Lab for M/s. Navana Electronics Ltd., Gazipur, Bangladesh. Mr. Pallab Paul, Dy. Manager from M/s. Navana Electronics Ltd., Bangladesh witnessed the test.

7 Seismic qualification of 800kV RIP Bushing tested at Earthquake Vibration and Research Center (EVRC) for M/s. Massa, LLC, Russia.

Patents Granted

1 Patent has been Granted for the invention titled "Fly Ash Cenosphere Composites for Sanitation Applications" made by Material Technology Division, CPRI, Bengaluru. This invention relates to a process of producing sanitation products using fly ash cenosphere composites. Municipal sewer networks are designed to cater for sewage flow. These sewer networks consist of pipelines, manholes and manhole covers directed towards the septic tank, sewage treatment plant or receiving water body. Presently, use of pipes of ductile iron or Poly Vinyl Chloride (PVC) is in force and the manholes are constructed using bricks / reinforced cement concrete. This type of sewer system undergoes sewer wear and tear and is prone to frequent repairs and maintenance. There is a need for manufacture of polymer composite based sewer system consisting of composite based pipes, manhole and manhole covers which exhibit superior properties in terms of strength, durability, lightweight, corrosion resistance, maintenance free and long lasting protection. The patent Inventors are Dr. M. Shekhar Kumar, Mr. T.R. Venkatesh and Dr. S. Seetharamu.

2 Patent Granted for the title "A Novel Method for Synthesis of Dawsonite from Fly Ash" made by Material Technology Division, CPRI, Bengaluru. This invention relates to synthesize of dawsonite from fly ash. Dawsonites are crystalline minerals generally present in nature as sodium aluminium carbonate hydroxide. Generally compositions with dawsonite type structure are synthesized by changing the nature of sodium or aluminium cat-ions in the structure. Dawsonites are used for various applications, viz. as ingredient in antacids, stabilizer in polymers, as precursor in catalytic reactions, dry extinguisher in fuel leak fires, and additive in synthetic fertilizers. The present invention is a novel process developed for the synthesis of dawsonite from fly ash, an industrial waste from Thermal Power Plant. The patent Inventors are Mr. K. Suryanarayana, Dr. M. Shekhar Kumar and Dr. S. Seetharamu

3 Patent has been Granted for the invention titled "A Microwave Sintering Process for Preparation of Angular shaped Granules for Filler application in Concretes and Composites" made by Material Technology Division, CPRI, Bengaluru. The invention relates to conversion of waste pulverized coal combustion particulates like fly ash, bottom ash and pond ash. The patent Inventors are – Dr. MG Ananda kumar Dr. M. Shekhar Kumar and Dr. S. Seetharamu

Tower & Vibration Test Facilities

Mechanical Engineering Division (MED) at CPRI Bangaluru has been serving electrical Industries and Utilities for more than Four decades. It has been involved in Research, Testing & Certification, Design & Validation, Consultancy, Third Party Inspection and Vendor Analysis programs. It has the state of the art and unique **Tower Testing Station** equipped for testing of all types of Prototype Transmission Line Towers, Tower like structures and Poles ranging from 66 kV to 765 kV HVAC / 800 kV HVDC category as per National and International Standards. **Design Group** of MED caters to the design and validation of Towers. **Vibration Laboratory** and **Wake Simulation Laboratory** as part of this division carry out the mechanical testing of all line components and accessories ranging from Conductors, Cables, Insulators, Dampers and hardware to substation equipments (viz., CT, PT, CVT, compact substation etc.) and also undertake field vibration studies on transmission lines conductors. This division had been accredited by NABL and BIS.

MED has the state of art facility to test and certify structural components. MED had also been catering to the mechanical testing requirements of various material and hardware other than that of transmission line (viz. drive gear shaft, earth switch isolator, pulley bundle block, screw conveyor, chain hoist, chequered plates and cable trays including computer table etc.,).

Test Facilities

(i) The Tower Testing Station caters to the testing of towers up to maximum height of 65 Meter with base width of 26 Meter x 26 Meter monopole. The facilities also include 100 Ton, 50 Ton, 20 Ton capacity hydraulic rams and Universal Testing Machines of 60 Ton and 10 Ton capacity which are used for mechanical testing of Insulator strings, structural components and other hardware and performance verification of load cells and indicators.

(ii) The Division is also equipped with facilities such as Electro Dynamic shaker system of capacity 300 kg force, Electro Mechanical shaker system of 1000 kg force and Electro Hydraulic shaker system of 1000 kg force,which are used for vibration damper testing, conductors and cables testing and Fatigue/ vibration testing on Assembly insulator string.

(iii) Design Group is fully equipped with high end software to cater to the Design / validation of all types of Transmission Line Towers / pole and foundation.

Tower Testing Station

132 kV Multi Circuit Tower

800 kV HVDC String

Vibration Laboratory

765kV HVDC Six bundle conductor

The tests are carried out as per relevant National and International standards and also Customer requirements

Prototype Tower Testing	IS 802 (Part III)/ IEC: 60652 /Customer's requirement
Steel Poles	IS 2713 (PART I TO III): 1980
Substation Equipments/ Current Transformer/ Power Transformer/CVTs/Capacitors Bushings/ Polymer Insulators	IS-9431:1979, RA-14, Cl:9.6.5,9.6.6.,9.6.7: 2014 IEC-60137-2008:07,RA-18, Cl 8.9: 2018
Creep Test on conductors	IEC 61395
Transmission line Conductors upto 800 kV	IS 398 & IEC
Vibration Damper upto 800 kV	IS 9708:1993
Spacer/Spacer Damper upto 800 kV	IS 10162:1982
Insulator & Insulator Strings of Single/Twin/Triple/ Quad-Tension or Suspension type upto 800 kV	Power Grid Specification

New Test Facility Added at Mechanical Engineering Division

Mechanical Engineering Division, CPRI, Bengaluru has established an indoor '**Creep Test Facility'** for testing of all types of transmission line conductors complying with the requirements **of IEC 61395 – 'Overhead Electrical Conductors - Creep Test Procedures For Stranded Conductor'.**The objective of the test is principally to calculate creep for any purpose and to compare creep of different conductors. The test finds out the inelastic nature of metal exposed to every day tension over long durations. The laboratory results are essentially used to produce long term room temperature tensile creep curve. The tests are conducted at a constant (conductor surface) temperature. maintained over the length of the conductor for a minimum period of 1000 Hours while the tensile load maintained at a constant load of 20 % of the rated tensile strength of the conductor under test. The creep curve and power-law equations are constructed for each load and extrapolated to 10 Years (87,600 Hours) which are used as a data and a key input parameter for the transmission line design in formulating the sag and loading conditions. It is preferred to test the conductor at different temperatures and at different tensile loads as mutually agreed upon by the supplier and purchaser.

Creeep Test Facility

New Test Facility Added at Regional Testing Laboratory, Noida

CPRI RTL-Noida has added a new facility for Water Penetration Test and Ampacity Test for medium voltage covered conductors as per EN 50397-1: 2006. A medium voltage covered conductor (MVCC) is typically composed of a compacted shaped aluminium alloy conductor along with layers of weather resistant XLPE - insulation. The basic idea for using covered conductors is to make the transmission line more tolerable against conductor clashing and trees leaning on the conductor. Furthermore, covered conductors enable reduced phase distances making the line even more compact when compared to conventional bare conductor with overhead line. This feature can be utilized by upgrading an old bare conductor line to a covered conductor line with increased power delivery capacity without the need to widen the right of way. An additional benefit of using covered conductor lines is increased safety in comparison to bare lines.

Water Penetration Test for Medium Voltage Covered Conductor (MVCC)

Participation in Exhibition

The Global Exhibition on Services - 2019 organized by Ministry of Commerce and Industry in partnership with Services Export Promotion Council (SEPC) and Confederation of Indian Industry (CII) was held at Palace Grounds, Bengaluru, from 26th to 28th November 2019. Shri Piyush Goyal, Honorable Union Minister of Commerce and Industry & Minister of Railways, Govt. of India inaugurated the event and Shri Jagadish Shettar, Honorable Minister of Large and Medium Scale Industries, Govt. of Karnataka was present during the occasion. The show focused on strategic cooperation and developing synergies to strengthen multilateral relationships covering twelve service sectors.

CPRI participated in the Exhibition and showcased its State-of-the-art Research, Testing facilities, Consultancy and Training activities in the Stall under Energy Pavilion. Many visitors interacted with CPRI Officers and showed interest in utilization of CPRI services.

The "Electric Myanmar 2019" organized by M/s. Fireworks Exhibitions & Conferences in association with Myanmar Engineering Society and Myanmar Electrical and Electronic Association was held at Yangon, Myanmar from 1st – 3rd August 2019. This is the only specialized Electrical and Power Generation event in Myanmar that brings together an International congregation of Government, Private and other Electrical companies. The exhibition helps industries to gather in Yangon to showcase the latest developments in Electrical and Power generation Industry.

Shri. P. Kaliappan, Joint Director, Power System Division and Shri. G. Pandian, Joint Director, Electrical Maintenance Division were deputed to man the stall. CPRI participated in the Exhibition and Showcased its State-of-the –art Research, Testing facilities, Consultancy and Training activities in the stall.

Visitors at Global Exhibition on Services, Palace ground Bangalore

Mr. Er. Aung Myint, President (second to right), Federation of Myanmar Engineering Societies at CPRI stall

Special test

❖ Seismic Qualification of 20kVA Smart Uninterrupted Power Supply was carried out for M/s. Schneider Electric IT Business India Pvt. Ltd., Bengaluru. Based on CPRI test report, product was approved by OSHPD- State of California, Health and Human Services Agency for Special Seismic Certification on August 15, 2019.

❖ 420kV Earth switch of M/s Raychem RPG pvt ltd., Kanjeri, Gujarat was tested for short time current test.

❖ Short-Time Current test on Ground Clamps at 16kA rms for 9 seconds was carried out for M/s. Oriental Export Corporation, Mumbai as per UL Standard.

Conference / Seminar / Workshop/Training Programmes

❖ Six days Residential Training Programme for Engineers of M/s. RITES Limited was conducted during 15th-20th July 2019. Ten Engineers participated in the Training Programme.

The Training Programme for M/s. RITES engineers is designed to give an impetus to the engineers to get exposed to the domain of Power Systems & Transformers.

The Training Programme mainly discussed about the important aspects such as Power Transformers, Current Transformer, Voltage Transformer, (CT & PT) Cables & Conductors, Insulators & Lightening Arrestors, Switch Gears and Control Gears, Short Circuit testing for MV & HV switchgear, Testing of Transformer Oil and Liquid Di-electrics, Performance evaluation of Power System Controllers, SCADA System/Control Panels and RTU panels operation, etc.,

Training Programme for RITES Engineers

❖ Two Weeks Residential Training Programme for Engineers of West Bengal State Electricity Transmission Company Limited, (WBSETCL) Kolkata (Batch-01) was conducted during 26th August to 10th September, 2019. Eighteen Engineers participated in the Training Programme.

The Training Programme mainly focussed on the important aspects of Electricity Transmission such as Power System Studies, Power procurement, RE Penetration, Grid Balancing, Transmission line Construction, Design and Testing aspects of Transmission Lines, ROW issues and compensation, Solar forecasting, Deviation Regulations, HVDC technology, LBB Protection & fault, SCADA implementation, AIS and GIS, SAS systems Operation and maintenance of transmission lines, Electricity Act-2003, PERT/GANTT chart, Renewable Energy penetration, wind and Solar variations in generations, RE integrations, Reactive power management, FACTS devices, Earth Mat Design, Protection of Transmission Lines and Power Transformers, Condition monitoring of Oil Analysis, PMU, Wide Area Measuring Systems, CEA safety standards and Safety aspects in transmission lines and substation, Grid operations NLDC, RLDC and SLDC, Grid Code-IEGC, etc.,

Training Programme for WBSETCL Engineers Batch - 1

❖ Three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL) Kolkata (Batch-38) was conducted during 22nd July to 10th August, 2019. Twenty Nine Engineers participated in the Training Programme.

❖ Three Weeks Residential Induction Training Programme for Engineers of West Bengal State Electricity Distribution Company Limited, (WBSEDCL) Kolkata (Batch-39) was conducted during 02nd-21st September, 2019. Nineteen Engineers participated in the Training Programme.

The Training Programme mainly focussed on 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.,

❖ CPRI, Hyderabad conducted one day Tutorial Program on "Dielectric and Special tests on Instrument & Power Transformers" on 23rd August 2019. Twelve delegates from various organisations attended the tutorial programme.

Training Programme on Dielectric and Special tests on Instrument & Power Transformers

❖ Five Days Residential Training Programme for Engineers of NHPC Limited (Batch 1) was conducted during 16th-20th September, 2019. Twenty Five Engineers participated in the Training Programme.

The Training Programme mainly discussed about the important aspects such as Condition Monitoring / Testing of Generators, Transformers, Breakers, Switchyard Equipment, Testing of HV Cables, Relays/ Controllers, Insulation Materials, Best Grounding Practices, Demonstration of Tests on Testing of Transformer Oil, DGA, Furan Analysis at Liqid Dielectrics Laboratory, Chemistry & Manufacturing of Transformer Oil and Sampling of Transformer Oil, Physical, Chemical & Electrical Tests and Assessment of Transformer oil , Dissolved Gas Analysis (DGA).

Special Tests Carbon Composition, Sulphur content, Gassing Tendency, Degree of Polymerization, Furan Analysis & Case Studies, Polymeric Materials, Solar PV Module Testing, Condition Monitoring of Mechanical Equipment through NDE, Concepts of Energy Auditing of Hydro Power Plants.

Training Programme for Engineers of NHPC Limited Batch-1

❖ Five Days Residential Training Programme for Engineers of NHPC Limited (Batch 2) was conducted during 23rd-27th September, 2019. Twenty Three Engineers participated in the Training Programme.

The Training Programme mainly discussed about the important aspects such as Offline Condition Monitoring of Hydro Generators, Offline Condition Monitoring of Transformers at Site, Online Partial Discharge Condition Assessment of Generator Transformers in Hydro Power Station, Diagnosis and Condition Monitoring of EHV Circuit Breakers, Condition Monitoring / Testing of Switchyard Equipment, R&M and DPR Preparation for Renovation, Modernization and Upgradation of Hydro Power Plants, Overview of Non-Destrutive Testing Methods of Hydro Power Plant/ Condition Assessment of Water Conduit Systems, Protection of Hydro Generators, Earthing of Hydro Power Stations, Condition Assessment of Civil Structures, RMU of hydro power plants, Types of Hydro Power Plants, Flow Chart of typical hydro power plant.

Training Programme for Engineers of NHPC Limited Batch -2

❖ Five Days Residential Training Programme on "Testing of Lubricating oil" for Three officers of Druk Green Power Corporation Ltd, Bhutan was conducted during 23rd-27th September, 2019 at Dielectric Materials Division.

Training Programme for officers of DGPC Limited, Bhutan

❖ One day workshop on 'Open Protocol Testing of Smart Energy Meter in Indian Scenario' was organised by Metering and Utility Automation Division (MUAD) at CPRI, Bengaluru on 13rd December 2019. The objective of the workshop was to exchange knowledge, share the experience in DLMS protocol testing of Static & Smart Energy Meters, failure analysis thereon, testing challenges for future expectations and discussed Smart Meter functional requirements in Indian Scenario. The topics covered are 'Open Protocol Testing as per Indian Standards – IS: 16444 & IS:15959', 'Open Protocol Testing challenges & future expectations', 'COSEM Object Model & Interfaces Classes' and 'Open Protocol Testing of Static meters'. The topics were covered by the internal faculty of MUAD-CPRI. The workshop was very well appreciated by all the participants and thanked CPRI for providing such a valuable platform.

One day workshop on 'Open protocol testing of Smart Energy Meter in Indian Scenario'

❖ Two days National Conference on "Transformers and Allied Equipment" was organized by High Power Laboratory at Gokulam Grand Hotel & Spa, Bangalore on 19th & 20th December 2019. The objective of the Conference was to provide an opportunity to know about the Technology trends in Design, Testing, Operation and Maintenance of Power & Distribution Transformers and also interact with Manufacturers, Designers, Researchers, Utilities, Policy makers, Academicians etc. About 65 delegates from various parts of the country participated in the Conference. The Conference was very well appreciated by all the participants and thanked CPRI for providing such a valuable platform.

❖ One day Workshop on "Design, Testing and Analysis of Distribution Transformers for Optimal Performance Evaluation" was organized by Short Circuit Laboratory, CPRI, Bengaluru on 22nd November, 2019. About Sixty delegates participated in the Workshop. Seven technical papers were presented in the Workshop and two Guest Lectures were also arranged from the Industry Experts. Overwhelming response was received from manufacturers and the utilities from various places across the country. Workshop was well appreciated by the participants and encouraging feedbacks received.

One day Workshop on Design, Testing and Analysis of Distribution Transformers for Optimal Performance Evaluation

Two days National Conference on "Transformers and Allied Equipment"

Research Papers Published / Presented at International Conferences

Sl. No.	Topic / Title	Authors	Presented/Published in Conference/Journal
1	"Partial Discharge Pulse Discrimination of Different Conducting Particles In Transformer Oil Under Uniform Field"	Rahman Muhammed Faisal Dr.Pradeep M Nirgude Burjupati Nageshwar Rao K P Meena	International Symposium on High Voltage Engineering (ISH 2019) organized by Budapest School of High Voltage Engineering, Budapest, Hungary during 26th to 30th August 2019.
2	"Effect of Non-Conducting Particle In Transformer Oil Partial Discharge Characteristics"	Rahman Muhammed Faisal Dr.Pradeep M Nirgude Burjupati Nageshwar Rao K Thirumurthy	International Symposium on High Voltage Engineering (ISH 2019) organized by Budapest School of High Voltage Engineering, Budapest, Hungary during 26th to 30th August 2019.
3	"Green bio-polymer and their nanocomposite"	D Gnanasekaran	Springer-Nature, Singapore, ISBN:978-981-13-8062-4, Series ISSN:2524-5384
4	"Steady state and transient analysis of FSIG and DFIG integration to grid for different penetrating levels using VSC-HVDC"	P Noorcheshma J Sreedevi V Siva Prasad K S Meera	International Conference on Emerging Trends in Electrical, Electronics and Computer Engineering (ICETEEC-2019), held at Reva University, Bengaluru, on 25th& 26th July 2019.
5	"Circulating current suppression control in Surrogate network of MMC for a point-to-point HVDC system"	M. N. Raju J. Sreedevi Dr.Rajashekar P Mandi Meera K S	International Conference on Emerging Trends in Electrical, Electronics and Computer Engineering (ICETEEC-2019), held at Reva University, Bengaluru, on 25th& 26th July 2019.
6	"Voltage stability of Power System using PV curve and PMU data,"	Ashwin N J Sreedevi Pradipkumar Dixit Meera K S	International Journal of Recent Technology and Engineering (IJRTE), Volume No.8, Issue No.3, September 2019
7	"Harmonic impacts of warm and cool white LED bulbs"	K. Jeykishan Kumar	IEEE Global Conference for Advancement in Technology (GCAT) conducted by IEEE Bengaluru Section in association with Nagarjuna College of Engineering and Technology, Bengaluru, from 18th to 20th October 2019.
8	"Structural, Thermal and Dielectric behaviour of Polyaryletherketone (PAEK)/CaCu3Ti4012 (CCTO) nanocomposite films"	A. Ashokbabu Dr. P Thomas	Ceramics International, Volume No.45, Issue No.18, Part B, 2019, page Nos.25052-25059, ISSN 0272-8842

Events

❖ CPRI celebrated 73rd "Independence Day" on 15th August 2019 at Head Quarter Bengaluru & other units of CPRI. Director General unfurled the National Flag. The Staff and families of CPRI were present on this occasion. CPRI received the Prize from Mysore Horticultural Society for the best Ornamental Garden.

73rd Independence Day Celebration at CPRI, Bengaluru

❖ CPRI celebrated Swachhta Hi Seva from 23rd September 2019 to 01st October 2019 at Head Quarter Bengaluru & other units of CPRI. During the Swachhta Hi Seva theme "Plastic Waste Management", CPRI lead an awareness campaign and undertook Shramdaan for plastic waste collection.

❖ On the occasion of Vigilance Awareness Week, integrity pledge was administered to the employees on 28th october 2019. The observance of Vigilance Awareness Week concluded on 1st November 2019 with an invited talk by Shri A Gnanasekaran, Chief Vigilance Officer, M/s ITI Ltd., Bengaluru & Controller of Communications Accounts, DOT, Karnataka Circle. The Chief Guest in his address emphasized vigilance awareness in day to day functioning and shared his knowledge on malafide and bonafide intention on Vigilance. He also stressed the policy and procedures of Central Vigilance Commission with special reference to Vigilance Awareness Week so as to create a positive environment which is enabler for taking decisions. The officers and staff of the Institute attended the programme

Observance of the "Vigilance Awareness Week" at Head Office

❖ The State Level Painting Competition 2019 on Energy Conservation was held in the premises of Centre for Collaborative and Advanced Research (CCAR), CPRI, Bengaluru on 14th November 2019. Fifty students in Group A Category and Forty nine students in Group B Category participated in the Competition

The prize distribution Ceremony was presided by Shri. V. S. Nandakumar, Director General CPRI. Mrs. Nazneen Banu, Director NGMA, the Chief Guest and Dr. K. T. Varughese, Additional Director, CPRI, graced the function. The Programme was co-ordinated by Dr. M G Anandakumar, Joint Director and State Nodal Officer. Prizes were distributed to the winners of both A & B Categories. The programme was well attended by about 350 audiences.

Painting Competition - 2019 Prize winners of State Level

❖ Hindi Divas was celebrated on 24th September 2019. Shri B. Sridhar, Chief Administrative Officer welcomed the gathering and also the award winners of the technical articles competition. Dr. Narayan Panigrahi, Scientist 'G', Center for Artificial Intelligence & Robotics (CAIR), Bengaluru was the Chief Guest of the function. He highlighted the importance of Hindi and its different forms and also spoke about the advantage of learning multi Indian languages. He also mentioned that Indians are less prone to Alzheimer disease. Prizes were distributed to the winners of various competitions held during the Hindi month. The programme concluded with a Bhajan by Smt. Tulika Bhattacharya, Engineering Officer.

Hindi Divas Celebration at CPRI, Bengaluru

Accolades

❖ Dr. D. Gnanasekaran, Scientific Officer, Dielectric Materials Division, CPRI-Bengaluru has published a book as an Editor titled "Green Biopolymers and their Nanocomposites, Series: Materials Horizons:" From Nature to Nanomaterials in Springer Nature, Singapore. The book scrutinizes the state of the art of biopolymer development from renewable resources for a variety of applications; provides general awareness for new environmental policies, societal concerns, and growing environment which has triggered the search for new products; and covers global biodegradable polymer market as well as its research scenario. Also, it covers plastic waste generation status in India; especially briefed in state-wise, recent developments, and trends in green biopolymers technology. The book comprises following few important general awareness to the public,

Polymer/plastic has been an inherent part of our daily life. Right from the ordinary polythene bags to encasing of a tech gadget, polymers have been used almost everywhere. As useful as it is, a polymer is not the most environmentally friendly material. Our constant use of it has seen huge amounts of it lodged in Arctic sea ice, penetrating into the deepest parts of the ocean and even travelling upto the food chain. A recent survey shows that India is the third-largest polymer consumer in the world, with a total consumption of polymers of about four million tons and resulting waste production of about two million tons. For these reasons, throughout the world today, the development of biodegradable polymeric materials, i.e., natural polymers with controlled properties, has been a subject of great challenge to materials scientists and engineers.

The book highlights the importance and impact of eco-friendly green polymer/plastics, both environmentally and economically. The contents of this book will prove useful for students, researchers, and professionals working in the field of nanocomposites and polymer/plastics for energy generation technology.