

# *B. N. M. Institute of Technology*

An Autonomous Institution under VTU

## **Department of Electrical & Electronics Engineering**

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### **Details of Center of Excellence: High Voltage Engineering (HVE)**

**COE: High Voltage Engineering (HVE)**

**Company Name: M/s Manobhu Tecnology Pvt. Ltd.**

**Contact Details: Mr. N Vasudev, Director, [vasudevdr@gmail.com](mailto:vasudevdr@gmail.com), 9845378943**

**SPOC Name: Dr. Priyashree S**

**Date of MoU Signed:**

- **First MoU Date: 09<sup>th</sup> Nov 2019 to 09<sup>th</sup> Nov 2021**
- **First Renewal Date: 10<sup>th</sup> Nov 2021 to 10<sup>th</sup> Nov 2026**
- **Second Renewal Date : to be renewed before 10<sup>th</sup> Nov 2026**

### **Objectives of COE:**

1. To establish advanced facilities for testing and performance evaluation of high-voltage equipment, including insulators, transformers, bushings, surge arresters, cables, circuit breakers, and insulating materials, in accordance with IEC, IEEE, and IS standards.
2. To promote research and innovation in high-voltage insulation systems through experimental studies on dielectric breakdown, partial discharge, insulation ageing, tracking and erosion, lightning impulse, switching impulse, power-frequency withstand, and pollution performance of insulating materials and equipment.
3. To provide industry-oriented training, testing, consultancy, and certification services in High Voltage Engineering by developing expertise in high-voltage testing, insulation diagnostics, condition monitoring, failure analysis, and quality assurance for utilities, manufacturers, and academic institutions.

## Details of the facilities available in the R & D Center and Center of Excellence in High Voltage Testing:

| Sl. No. | Name of Facility                                          | Description of Facility                                                                                                                                                                                                                                                                                                                                          |
|---------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Inclined Plain Tracking and Erosion Tester                | <ul style="list-style-type: none"> <li>• Voltage Range: 0-6 kV HVAC.</li> <li>• The equipment meets the guidelines of : IEC 60587</li> <li>• Capable of testing solid dielectrics namely Silicone insulating material, EPDM insulating material, EVA insulating material and Cables insulation check</li> </ul>                                                  |
| 2       | Flash and Fire Point Meter                                | <ul style="list-style-type: none"> <li>• Temperature Range: 49 °C – 400 °C</li> <li>• The equipment is in compliance with: IS: 1448, ASTM D93, D3934, D3941, D3278, D3828, IP 304, 404, BS3900, 6664, ISO-1516,1523, 2719, DIN51 758.</li> <li>• Capable of testing mineral oil, vegetable oil, silicone oil and mixed insulating fluids.</li> </ul>             |
| 3       | Kinematic Viscosity Measurement Meter                     | <ul style="list-style-type: none"> <li>• Viscosity Range: 3 cSt – 35 cSt</li> <li>• Temperature Range: AMB. to 100 °C</li> <li>• Compliance: ASTM D445; ASTM D446; ASTM D2270 - IP 226; BS 188; BS 2000 Part 71, BS 4459; ISO 2909</li> <li>• Capable of measuring viscosity of mineral oil, vegetable oil, silicone oil and mixed insulating fluids.</li> </ul> |
| 4       | Magnetic Stirrer with Hot Plate & Digital Speed Indicator | <ul style="list-style-type: none"> <li>• Max. Speed: 1200 RPM.</li> <li>• Capacity: 1 Litre</li> <li>• Can be used mix different liquids dielectric fluids and additives</li> </ul>                                                                                                                                                                              |
| 5       | Negative Sequence Relay with Test Kit                     | 1A, 250V AC                                                                                                                                                                                                                                                                                                                                                      |
| 6       | Numerical Directional / Non-Directional Overcurrent Relay | 5A/1A current rating, 110V AC                                                                                                                                                                                                                                                                                                                                    |
| 7       | DigSILENT Power Factory for Education                     | Load Flow Analysis, Short-Circuit Analysis, Load Flow Sensitivities, Basic MV/LV Network Analysis, Relay coordination, Transient Stability, Optimal Power Flow                                                                                                                                                                                                   |

## Research Activities and Innovations:

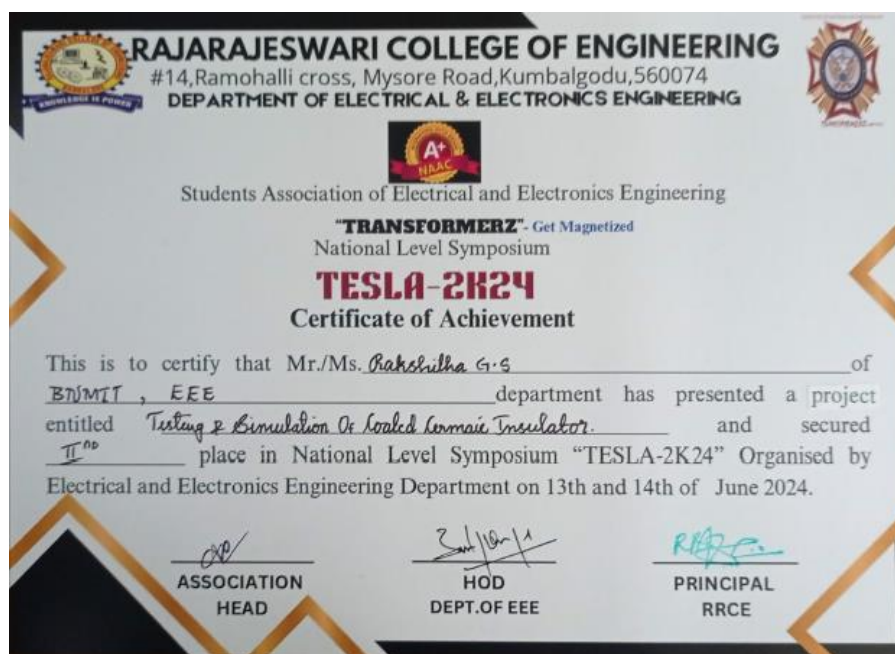
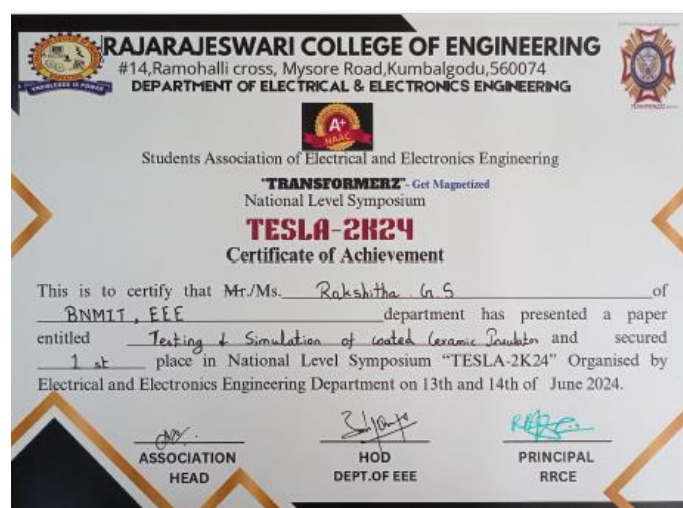
1. Under Industry Institute Collaboration, M/s. Manobhu Technology Pvt. Ltd., Bangalore provided Silicone Rubber Samples for the testing purpose to be carried out in the HV laboratory of the EEE department during 2020-21.
2. Under Industry Institute Collaboration, a research proposal entitled “Effects of Corona Discharge and the Influence of Corona Ring on Polymer Insulators: An Experimental and Computational Investigation” was submitted to Vision Group of Science and Technology (Application No: VRN/002820/21-22), under CESEM scheme on 24<sup>h</sup> February 2022.
3. Under Industry Institute Collaboration, a research proposal entitled “Evaluation of Insulator Surface Erosion under DC Inclined Plane Tracking and Erosion Test” was submitted to Vision Group of Science and Technology (Application No: VRN/002820/21-22), under RGS-F scheme on 28<sup>h</sup> February 2022.
4. Received RTV coated product (RTV-274-01-0421) samples (5 No.) for testing on 10.07.2023 from M/s. Manobhu Technology Pvt. Ltd., Bangalore.
5. Under Industry Institute Collaboration, a research proposal entitled “Investigating the Impact of Contamination and Corona Discharge on Composite Insulators: An Experimental and Computational Analysis” was submitted to Vision Group of Science and Technology (Application No: VRN/004659/23-24), under K-FIST L1 scheme on 21st June 2024.

### List Undergraduate Projects Carried out in Centre of Excellence in High Voltage Testing

| Sl. No. | Undergraduate Project Title                                                                                              | Students Involved                                                      | Year    |
|---------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------|
| 1       | Experimental and Simulation Studies on Silicone Insulating material under Inclined Plane Tracking and Erosion Test       | 1. Manoj Kumar S<br>2. Seema S Rao<br>3. Soujanya<br>4. Chethan Y N    | 2020-21 |
| 2       | Experimental and Simulation Studies on Polymer Insulator under Inclined Plane Tracking and Erosion Test                  | 1. Shubhra Jyothsna B<br>2. Reethu K<br>3. Sinchana K N<br>4. Sowmya R | 2022-23 |
| 3       | Testing, Simulation and Analysis of RTV Silicone Coated Ceramic Insulator under Inclined Plane Tracking and Erosion Test | 1. Rakshitha G S<br>2. Jadesha K<br>3. Karthik S<br>4. M U Somasekhar  | 2023-24 |

## Student Achievements:

1. Secured 2<sup>nd</sup> place in National Level Symposium - TESLA – 2K24 conducted by Dept. of EEE, Rajarajeshwari College of Engg, 13<sup>th</sup> and 14<sup>th</sup> June 2024, for Project on “ Testing, Simulation and Analysis of RTV Silicone Coated Ceramic Insulator under Inclined Plane Tracking and Erosion Test
2. Secured 2<sup>nd</sup> place in National Level Symposium - TESLA – 2K24 conducted by Dept. of EEE, Rajarajeshwari College of Engg, 13<sup>th</sup> and 14<sup>th</sup> June 2024, for Project on “ Testing, Simulation and Analysis of RTV Silicone Coated Ceramic Insulator under Inclined Plane Tracking and Erosion Test
3. Rakshitha Secured Second prize for Project Title “ RTV Coated Ceramic Insulator” in Avinya 2024, Inter College Project Competition, 2023-2024, BNMIT



### **Proposed Work:**

- **Ongoing Project :** “Evaluation of Dielectric Surface Degradation in Polymeric Insulators” – 2026-2027, Carried out by : Achyutha U (1BG23EE003), Samana P Joshi (1BG23EE040), Seshadri S (1BG23EE043), Shreya P S (1BG23EE050)
- Organize an industry visit to **M/s. Manobhu Technology Pvt. Ltd.**, to familiarize students with advanced high-voltage testing equipment, testing procedures for insulators and other electrical equipment, quality assurance practices, and industry standards.
- Invite **Mr. N Vasudev** to serve as an **Adjunct Faculty** for the High Voltage Engineering Centre of Excellence to deliver specialized lectures, mentor students, and support research in high-voltage testing and insulation systems.

## ***The Centre of excellence in High Voltage Testing***

The Department of Electrical and Electronics Engineering, BNMIT with the grant-in-aid from AICTE under the MODROBS scheme has procured state-of-the-art equipment and established Centre of Excellence in High Voltage Testing. The equipment commissioned in the laboratory meets national & international standards and are traceable to National Accreditation Board for Testing and Calibration Laboratories certification. This multifaceted unique Centre of Excellence is now open for testing, consultancy related activities and research collaborations.



### **1. Inclined Plane Tracking and Erosion Tester**

- **Voltage Range:** 0-6 kV HVAC
- **Compliance:** IEC 60587

### **2. Flash and Fire Point Meter**

- **Temperature Range:** 49 °C – 400 °C
- **Compliance:** IS: 1448, ASTM D93, D3934, D3941, D3278, D3828, IP 304, 404, BS3900, 6664, ISO-1516,1523,2719, DIN51 758.

### 3. Kinematic Viscosity Measurement Meter

- **Viscosity Range:** 3 cSt – 35 cSt
- **Compliance:** ASTM D445; ASTM D446; ASTM D2270 - IP 226; BS 188; BS 2000 Part 71, BS 4459; ISO 2909

### 4. Magnetic Stirrer with Hot Plate & Digital Speed Indicator

- **Max. Speed:** 1200 RPM.
- **Capacity:** 1 litre

### Unique Features of the laboratory:

- 100 kV HVAC and 140 kV HVDC Source
- DIgSILENT Power Factory Software
- Distribution class insulator assembly



**For further details, Contact:** Dr S Sudalai Shunmugam, In-Charge, Centre of Excellence for High Voltage Testing, BNMIT. Email: [sudalaishunmugam@bnmit.in](mailto:sudalaishunmugam@bnmit.in), Mob: +91 9886692042



## Resources

The partners will endeavour to secure and fulfill their individual contributions at the start of the planning for the development of the Project works.

- a. MANOBHU TECHNOLOGY, BANGALORE agrees to provide the following resources in respect of the task.

INSULATION COORDINATION, EXTERNAL INSULATION DESIGN, HIGH VOLTAGE INSULATOR AND ITS DESIGN, LIGHTNING ARRESTERS AND ELECTRICAL EARTHING

- b. BNMIT, BANGALORE hereby agrees to provide the following material and expertise resources in respect of the task.

- Will depute students of their Institution for THEIR SKILL UPGRADATION
- Will assist in providing Expertise and Consultancy and related instruction materials whenever required by MANOBHU TECHNOLOGY, BANGALORE for the works at MANOBHU TECHNOLOGY, BANGALORE

## Communication Strategy

Coordinated communications may be made with external organizations to elicit their support and to further the aims of the task if the need be with mutual consent.

## SPOC

HOD, EEE will be the single point of contact on behalf of BNMIT, Bangalore.

## Liability

No liability will arise or be assumed between the partners as a result of this Memorandum.

## Dispute Resolution

Both the parties reserve the right to cancel/terminate the project on their discretion with a notice of thirty days.

## Term

The arrangements made by the Partners by this Memorandum shall remain in place from 09-11-2019 to 09-11-2021. The term can be extended only by agreement of all of the Partners.

## Assignment

Neither party may assign or transfer the responsibilities or agreement made herein to other parties.

## Amendment

This Memorandum may be amended or supplemented in writing, in case of change in administering officer from both ends.

purpose of achieving aims and objectives relating to the task of Project work, Internship, of aspiring engineering students as Academia- Industry collaboration. This Agreement shall be signed on behalf of M/S.MANOBHU TECHNOLOGY, BANGALORE by, MANOBHU, BANGALORE, and on behalf of BNM INSTITUTE OF TECHNOLOGY (BNMIT), BANGALORE, by the Principal/ Director. This Agreement shall be effective as of the date first written above.

WHEREAS MANOBHU, BANGALORE and BNMIT, BANGALORE desire to enter into an agreement in which MANOBHU, BANGALORE and BNMIT, BANGALORE will work together to complete the task.

AND WHEREAS MANOBHU, BANGALORE and BNMIT, BANGALORE is desirous to enter into a Memorandum of Understanding between them, setting out the working arrangements so that each of the partners agrees to complete the task.

### **Purpose**

The purpose of this Memorandum is to provide the framework for future binding contract regarding the PROJECT WORK& TRAINING at BNMIT, BANGALORE and INTERNSHIP for the students at MANOBHU, BANGALORE& FDP programme for staff of BNMIT, BANGALORE.

### **Obligations of the Partners**

The Partners acknowledge that no contractual relationship is created between them by this Memorandum, but agree to work together in the true spirit of partnership to ensure that there is a united visible and responsive leadership of the task and to demonstrate commitment to the task by means of the following individual services.

### **Cooperation**

The activities and services for the task shall include and limited to:

a. Services to be rendered by MANOBHU, BANGALORE include:

Helping project works of the students of BNMIT on Electrical Insulation and coordination, High voltage insulators, Insulator designs as per the schedule in MANOBHU, BANGALORE. Projects shall be carried out at BNMIT, BANGALORE.

b. Services to be rendered by BNMIT, BANGALORE include:

EXCHANGE OF KNOWLEDGE, EXPERTISE & CONSULTANCY to MANOBHU TECHNOLOGY PVT LTD, BANGALORE in the area related to Electrical Engineering, High voltage Engineering, Power systems as and when requested by MANOBHU TECHNOLOGY, BANGALORE, as per the availability.

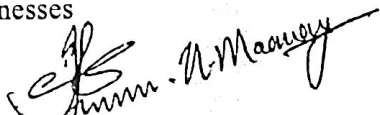
## Understanding

It is mutually agreed upon and understood by and among the Partners of this Memorandum that:

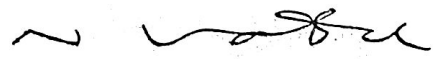
- a. Each Partner will work together in a coordinated fashion for the fulfillment of the task.
- b. In no way does this agreement restrict involved Partners from participating in similar agreements with other public or private agencies, organizations, and individuals.
- c. To the extent possible, each Partner will participate in the development of the task.
- d. This Memorandum is not intended to and does not create any right to represent on behalf of each other to the third parties without mutual accent.
- e. This Memorandum will be effective upon the signature of both Partners.
- f. Any Partner may terminate its participation in this Memorandum by providing written notice to other Partner.
- g. IN WITNESS WHEREOF the parties have executed this Memorandum of Understanding and affix their respective signatures on the day and month of 2019 written in the presence of witnesses.

Witnesses

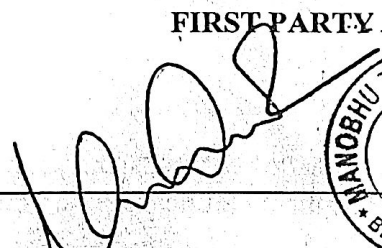
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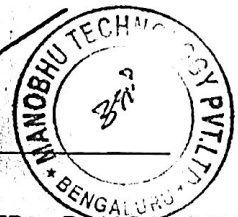
  
DEAN, ADMID  
BNMIT.

2.

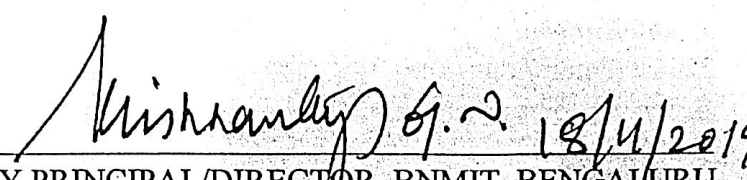
  
(Dr. N. VASUDEV)

FIRST PARTY.

  
Director,  
MANOBHU TECHNOLOGY PVT. LTD., BANGALORE



SECOND PARTY

  
BY PRINCIPAL/DIRECTOR, BNMIT, BANGALURU

*Principal*  
BNMIT Institute of Technology

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