



This short-term course is specially designed and framed taking into account the recent trends of state-of-the-art of real-time Hardware-in-the-loop simulation concepts and technologies that are used for the analysis, design, and testing of different power electronics converters and power system networks and also their related apparatus. This short-term course focuses on the main problems in modeling accuracy, system bandwidth and stability, limitations on communication interface and energy interface. Particularly the course describes the main building blocks of the real-time simulator, i.e., hardware, software, input-output systems, modeling, and solution techniques, interfacing capabilities to external hardware and various applications. Preferably, this course covers the more significant type real-time digital simulators like OPAL-RT, D-SPACE, Typhoon Hill which are in generally used both in industry and academia. The course is applicable for students and researchers from power electronics and power system area who want to do research in fast growing and cutting edge technologies. Also, it will be suitable for engineering professionals from academia, R&D organizations as well as industries.

## Course Contents:

- Numerical methods: explicit and implicit methods; offline simulation of simple circuits.
- Power converters, apparatus and networks: dc-dc converters, voltage source inverter, synchronous machine, transformer, transmission line, single machine infinite bus system, IEEE 3-generator system.
- Review of continuous-time models of power converters, apparatus and networks; discrete-time modeling of power elements and networks
- Educational real-time simulator (OPAL-RT, D-SPACE, Typhoon Hill): Introduction and overview; architecture and system organization; examples of subsystem hardware and firmware; programming environment
- Real-time simulation exercises: simple circuit examples, dc-dc converters, voltage source inverter, induction machine, synchronous machine, a simple micro-grid (i.e., inverter and DG set).



## National Institute of Technology Jamshedpur

### *A FIVE Day Online Short-Term Course On*

### **Real Time Simulation for Power Electronics and Power Systems Applications**

**21<sup>st</sup> to 25<sup>th</sup> August 2023 (Online-mode)**

- Patron:** Prof. Goutam Sutradhar  
Director, NIT Jamshedpur
- Chairperson:** Dr. U. K. Sinha  
Head, EED, NIT Jamshedpur
- Coordinators:** Dr. Mrinal Kanti Sarkar  
Dr. Simanta Kumar Samal
- Conveners:** Dr. (Mrs.) Madhu Singh  
Dr. Ananyo Bhayttacharya

**Organized By:**  
Dept. of Electrical Engg. NIT  
Jamshedpur

## Course Objectives:

- Mathematical modeling of power converters, apparatus and networks.
- Numerical techniques, offline simulation and simulation exercises.
- Introduction to an educational real-time simulator developed as part of a national project.
- Hands-on sessions on the educational real-time simulator.
- Interfacing capability to external hardware set-up.

## Whom will the course benefit?

Electrical engineering faculty, researchers and practicing engineers who are interested in modeling, simulation and real-time simulation of power converters, power apparatus and different electrical networks.



## Online Registration Form:

[https://docs.google.com/forms/d/e/1FAIpQLSf\\_5wExXxRIGaKQxTxZagkYAYjvNItE4s9uOWx3zOOg8\\_dllA/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSf_5wExXxRIGaKQxTxZagkYAYjvNItE4s9uOWx3zOOg8_dllA/viewform?usp=sf_link)

## Account Details for Payment of Registration Fee:

**Account Name:** Research and Consultancy  
NIT Jamshedpur  
**Account No.:** 38246478714  
**IFSC:** SBIN0001882  
**Branch:** SBI, Jamshedpur NIT Campus,  
Adityapur

## About the Institute:

The National Institute of Technology Jamshedpur (NIT Jamshedpur), is an Institute of National Importance located at Jamshedpur, Jharkhand, India. Established as a Regional Institute of Technology in 1960, it was upgraded to National Institute of Technology (NIT) on 27 December 2002 with the status of Deemed University. It is one of the 31 NITs in India, and as such is directly under the control of the Ministry of Human Resource Development (MHRD). It is the third in the chain of eight NITs established as a part of the Second Five Year Plan (1956–61) by the Government of India. The Institute has twelve departments including engineering, science and humanities. The institute offers a 4-year Bachelor of Technology degree in the various streams. The institute also offers Master and Ph.D degrees in various streams. The institute is bound to the quest for academic excellence and good governance, growth of institute, admired and respected institute for students, employees and industry, innovative leader.

## About the Department:

The Department of Electrical Engineering was started in 1960. The Department has been consistently producing quality Engineers since its inception and is also involved in research and development activities. The alumni of the department are well placed in both public and private sectors. In addition to the UG programme the department runs PG programme in Power Systems and Power Electronics and Drives and Ph.D. programme in different areas of specialization.

## Registration Details:

<b>UG students</b>	<b>Rs. 100</b>
<b>PG students/ Research scholars</b>	<b>Rs. 200</b>
<b>Faculty/ Industry percipients</b>	<b>Rs. 300</b>

## Important Dates:

**Registration deadline:** 19<sup>th</sup> August 2023

**Short-term Course Date:** 21<sup>st</sup> -25<sup>th</sup> August 2023

## Contact us:

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E-Certificate will be provided to all the registered participants.