



One-Week Hands-On Training Program on "Design and Characterization of Devices and Circuits for Electronic Systems"  
(19<sup>th</sup> – 25<sup>th</sup> September, 2022)

The Department of Science and Technology, Government of India, has given the responsibility to IIT (ISM) Dhanbad to build human resources and improve knowledge capacity using open access science and technology infrastructure through the scheme "***Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI)***". Thus, under the DST-STUTI programme of IIT (ISM) Dhanbad, a one-week hands-on training program on "***Design and Characterization of Devices and Circuits for Electronic Systems***" was organized during 19<sup>th</sup> September to 25<sup>th</sup> September, 2022 at Department of Electronics and Communication Engineering, NIT Durgapur, West Bengal.

This training program was coordinated by Dr. S. K. Mandal and Dr. N. Chattaraj from NIT Durgapur, and Prof. Sushrut Das from IIT (ISM) Dhanbad. This program includes thirty participants (Faculty/Research Scholar) from various universities/colleges in India.

Highlights of the Day-1 (Dated: 19<sup>th</sup> September, 2022)

Before the formal inauguration of the program the participants were provided a welcome kit that includes a note pad, folder, batch, a power kit (pen, pencil, eraser, and sharpener), and a program pamphlet and detailed program schedule. Then, the training program was inaugurated by Prof. Tamal Mandal, Chairman, Continuing Education Cell (CEC), NIT Durgapur and Dr. Durbadal Mandal, Head (Department of Electronics and Communication Engineering, NIT Durgapur). The local Program Coordinator, Dr. S. K. Mandal, Department of Electronics and Communication Engineering, welcomed all the participants and speakers, where as external Program Coordinator Prof. Sushrut Das, Department of Electronics Engineering, IIT (ISM) Dhanbad, explored with a brief introduction to the program's purpose and significance. The introduction motivated the participants' and helped to get interest in learning different aspects of science and engineering through the program. Following that, two consecutive lectures were scheduled. The first lecture (from 10:30 AM to 12:00 PM) was based on the device fabrication technology and was delivered by Prof. R. Mahapatra. The second lecture (from 12:15 PM to 01:45 PM) was based on the advancement of 2-D materials devices for the IoT and was delivered by Dr. S. Ranwa.





Next, after the lunch break, a practical demonstration (from 02:45 PM to 05:45 PM) on the fabrication and characterization of MIM devices was provided under the guidance of Prof. R. Mahapatra.

#### Highlights of the Day-2 (Dated: 20<sup>th</sup> September, 2022)

Similarly, on the second day, two lectures were scheduled. The first lecture (from 09:00 AM to 11:00 AM) was based on OPAMP design in CMOS process and was taught by Prof. A. K. Mandal. The second lecture (from 11:15 AM to 01:15 PM) was based on the VLSI chip design and was taught by Dr. H. K. Mandal.

Next, after the lunch break, a practical demonstration (from 02:15 PM to 05:15 PM) on the fabrication of MoS2 nanostructure using a chemical vapour deposition system was provided under the guidance of Dr. S. Ranwa.

#### Highlights of the Day-3 (Dated: 21<sup>st</sup> September, 2022)

On the third day, two lectures were delivered. The first lecture (from 09:00 AM to 11:00 AM) was based on embedded measurement systems and was taught by Dr. N. C. Chattaraj. The second lecture (from 11:15 AM to 01:15 PM) was focused on microwave network analysis and was taught by Prof. Sushrut Das.

Following the lunch break, a practical demonstration (from 02:15 PM to 05:15 PM) on counter design using Cadence Tool Suite in 45/90 nm technology node was provided under the guidance of Dr. H. K. Mondal.

#### Highlights of the Day-4 (Dated: 22<sup>nd</sup> September, 2022)

Similarly, on the fourth day, two lectures were given. The first lecture (from 09:00 AM to 11:00 AM) was focused on the 5G channel characterization and was delivered by Dr. A. Chandra. The second lecture (from 11:15 AM to 01:15 PM) was focused on D2D communication in 5G and was delivered by Dr. S. D. Roy.

Next, after the lunch break, a practical demonstration (from 02:15 PM to 05:15 PM) on 5G channel modelling was provided under the guidance of Dr. A. Chandra.

Sagar

Dr. A. Chandra

Dr. S. D. Roy





Highlights of the Day-5 (Dated: 23<sup>rd</sup> September, 2022)

On the fifth day, three invited talks were conducted. The first talk (from 10:00 AM to 11:15 AM) was focused on machine learning models for recommendation of products and was delivered by Prof. Sudeshna Sarkar, IIT Kharagpur. The second talk (from 11:15 AM to 12:30 PM) was focused on AI/ML for wireless physical layer communications and was delivered by Dr. Sudhan Majhi, IISc Bangalore. The third talk (from 12:45 PM to 01:45 PM) was focused on the internet of things and was delivered by Sri Suman Sinha, Director Engineering, Qualcomm India Pvt. Ltd..

Next, after the lunch break, a practical demonstration (from 02:30 PM to 05:00 PM) on antenna characterization was provided under the guidance of Dr. S. K. Mandal and Prof. Rowdra Ghatak.

Highlights of the Day-6 (Dated: 24<sup>th</sup> September, 2022)

On the sixth day, two lectures were given. The first lecture (from 09:00 AM to 11:00 AM) entitled "microwave and mm-wave measurement techniques" was delivered by Prof. R. Ghatak. The second lecture (from 11:15 AM to 01:15 PM) was based on microwave and mm-wave circuit design techniques and was also taught by Prof. R. Ghatak.

Next, after the lunch break, a practical demonstration (from 02:15 PM to 05:15 PM) on the basics of design and characterization of planar transmission line components and antennas was provided under the guidance of Prof. R. Ghatak and Dr. S. K. Mandal.

Highlights of the Day-7 (Dated: 25<sup>th</sup> September, 2022)

Similarly, on the seventh day (the last day of the training program), two lectures (the first lecture was from 09:00 AM to 11:00 AM and the second lecture was from 11:15 AM to 01:15 PM) were conducted based on the filter design and meta-heuristic optimization for synthesis of array antennas. These two lectures were delivered by Dr. D. Mandal and Prof. G. K. Mahanti, respectively.

Next, after the lunch break, a practical demonstration (from 02:15 PM to 05:15 PM) elaborating the design and characterization of planar transmission line components and antennas was provided under the guidance of Prof. R. Ghatak. After that, the valediction program was conducted. Following that, the certificate distribution ceremony took place. During each theory and Laboratory sessions the

Sagar

R. Ghatak

G. K. Mahanti





participants were enthusiasm to learn the subjects and they freely cleared there doubts through interactions with the respective subject teachers. During the valedictory session, most of the participants with their selfintiative way it is mentioned that they enjoyed the accommodation and food during their stay at NIT Durgapur and also, they have mentioned the same in their feedback form. Most of them were excited to attend in such program and also requested to continue such program at the Institute.

Throughout the training program, a formal and healthy discussion environment was established for the exchange of scientific and technological knowledge.

**Prof. Sagar Pal**

Coordinator (DST-STUTI)

**Prof. Ravi Kumar Gangwar**

Co-Coordinator (DST-STUTI)

**Prof. Sushrut Das**

Program Coordinator