National Institute of Electronics &Information Technology Aurangabad
CEDTI Complex, Dr. B.A.M. University campus
Aurangabad, Maharashtra-431004
http://www.nielit.gov.in/aurangabad/

NIELIT

Ministry of Electronics and
Information Technology
Government of India

PCB Design & Manufacturing

Online Certificate Course in PCB Design & Manufacturing

Course Duration- 2 Weeks
Theory-1Hr & Virtual Lab-2 Hrs.

Timings-(10:00am to 1:00pm)
Total- 3 Hrs. per Day
Start Date-16th June 2021

Course Description:- This course is designed to make the participants capable of Designing & Manufacturing Single sided & Double sided PCBs. After Completing this course, the participants would be capable of analysing the Various electronic circuitries. They will be able to do Electronic circuit simulation analysis, library component creation & customised footprints and symbol design for various electronic components. They will also be able to do Schematics Drawing, Netlist & BOM creation, PCB layout designing ,Gerber files generation, CNC milling & drilling data Generation, PCB Artwork creation & 3D-PCB files generation along-with Knowledge of Process flow for PCB Industrial fabrication process for SSBs & DSBs.

Eligibility:- Diploma/B.Sc/M.Sc/B.Tech/M.Tech in Electronics/Electrical/ Instrumentation/Science stream(Completed or Pursuing)

Prerequisite:- Basic Knowledge of Analog & Digital circuits.

Fee & Important dates:-

Course Fee	Rs. 2000/- incl. GST & all other charges.
Last Date for Registration & Payment	15th June 2021
Course Start Date	16th June 2021

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Minimum Hardware Requirements:- Attendees must have a computer/laptop with good internet connection speed along-with camera.

Mode of Course Delivery:- The course would be conducted in a virtual classroom environment which will be completely online, Course content includes Online Theory & lab sessions, Live interactive doubt clearance sessions, Course material in text/pdf format, Links to external resources and blogs, Online Forums, Lab Assignments, Tests etc.

Certificate:- Certificate will be provided to the participants, based on minimum 80% attendance and on performance (minimum 50% marks) in the online test, conducted at the end of the course.

How to Apply:-

➢ Read the course structure & course requirements carefully.
➢ Visit the Registration portal and click on apply button.
➢ Create your login credentials, fill up all the required details, check preview and Submit the application form.
➢ Login with your credentials to verify the mobile number, email ID and then upload the documents, Lock the profile and Pay the Fees online, using ATM-Debit Card / Credit Card / Internet Banking / UPI etc.

Course Coordinator:-

Saurabh Kesari (Scientist-C)
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Course Content

Day	Theory Topics	Lab Assignments
Day 1	➢ Introduction to printed circuit boards. ➢ Fundamentals of Basic electronic components.	➔ To learn about classifications, Terminologies & Fundamentals of PCB. ➔ To learn about Basic electronic components and their characteristics.
Day 2	➢ Various IC Packages classifications. ➢ IPC standards & fundamentals of electronic component's data-sheets study.	➔ To learn about various Through hole and SMD Components & IC packages. ➔ To learn about important IPC standards. ➔ To understand how to read data-sheets for various electronic components & ICs.
Day 3	➢ Customised Component symbol footprint & 3D Package creation using Autodesk EAGLE(open source/freeware platform of Fusion360) for Through hole and SMD packages.	➔ Create the library component for through hole resistor with the given specifications. ➔ Create the library component for 555 Timer IC with the given specifications. ➔ Create the library component for NCP716B LDO with the given specifications.
Day 4	➢ Design rules for Analog, Digital & Mixed signal circuits. ➢ Effects of EMI/EMC & Thermal design issues in PCB.	➔ To learn about Design rules for analog ,digital & mixed signal PCBs. ➔ To understand the thermal design issues & to learn about EMI issues in PCB.
Day 5	➢ Electronic circuit simulation for Analog, Digital & Mixed signal circuit using Autodesk EAGLE (NG-spice open source library) for Operating point, AC Sweep, DC Sweep & Transient analysis.	➔ Design the Basic diode circuit in schematic editor and Run the Operating point & Transient analysis simulation. ➔ Design the Basic BJT Oscillator circuit and run the transient analysis simulation. ➔ Design the Basic MOSFET Characterization circuit & run the DC Sweep analysis simulation.
Day 6	➢ Schematic editor introduction, schematics entry of electronic circuits.	➔ Draw the schematics of Astable Multivibrator circuit using 555

	➢ BOM, Netlist generation and ERC (Electrical rule check) Overview using Autodesk EAGLE.	timer IC in schematic editor and Run ERC. ➔ Draw the schematics of DC-TO-DC 5V Voltage regulator circuit using LM317 IC in schematic editor Generate BOM and Run ERC. ➔ Draw the schematics of USB to TTL/CMOS Programmer circuit using FTDI232 IC in schematic editor Generate Net-list, BOM & run ERC.
Day 7	➢ Introduction to PCB layout editor, PCB layout design for Single sided boards in layout editor using Autodesk EAGLE . ➢ Setting up the DRC(Design rule check) for SSB.	➔ Design the PCB layout for Astable Multivibrator circuit using 555 timer ic in layout editor & run DRC.
Day 8	➢ PCB layout design for Double sided boards in layout editor using Autodesk EAGLE. ➢ Setting up the DRC(Design rule check)for DSB.	➔ Design the PCB layout for DC-TO-DC 5V Voltage regulator circuit using LM317 IC in layout editor & run DRC. ➔ Design the PCB layout for USB to TTL/CMOS Programmer circuit using FTDI232 IC in layout editor & run DRC.
Day 9	➢ Gerber files Generation, CNC Milling & Drilling data generation in fabrication industry accepted formats, SMT pick & place file generation & 3D PCB files creation using Autodesk EAGLE. ➢ Artwork Generation using photo-plotter & Project Work.	➔ Generate Gerber files & CNC milling & drilling files for above designed circuits. ➔ Generate SMT pick & place file & IPC-D-356 Net-list file for above designed circuits. ➔ Create DXF ,IDF/3D PCB files for above designed circuits ➔ Learn the process of converting Gerber files into photo-plotter file format for artwork/film Generation of PCB.
Day 10	➢ PCB Fabrication Process flow for Double sided plated through hole PCBs using NIELIT, Aurangabad PCB Lab DSB PTH Machine setup. ➢ Project work.	➔ To understand & learn the process of Double sided plated through hole PCB Fabrication/Manufacturing flow. ➔ Online Test (1 hr duration).