

COURSE PROSPECTUS

Name of the Group: *Product Engineering Group*

Name of the Course: *Advanced PG Diploma in Electronic Product Design and Manufacturing*

Course Code: *PD 500*

Starting Date: *August 19, 2019*

Duration: *6 Months*

Course Coordinator: *Mr. Ishant Kumar Bajpai, Scientist/Engineer 'C'*
Email: ishant@nielit.gov.in, Mobile: +91-7034797019/+91-9958016673

Preamble: *Emergence of India as a global economy has opened up a huge demand for electronic products. National Policy on Electronics and Make in India initiative of Government of India has resulted in setting up of many industries in the Electronics Sector and has led to a huge demand for trained man power in Electronics System Design and Manufacture (ESDM).*

Objective of the Course: *To enable new electronics graduates/post graduates or working engineers in electronic industry; specify, design, develop and test electronic products. This course will bridge the major gap in competencies required to design, manufacture and market state-of-the art electronics products.*

Outcome of the Course: *On successful completion of the Course, the Participants shall*

- *Be able to specify, Design, Develop and Test electronic Products.*
- *Get exposure to Industrial Design of Electronic Products*

Course Structure: *This course consist of six modules. The modules are as follows:*

PD 900	Module Name	Duration (Weeks)
PD 901	Industrial Design of Electronic Products	2
PD 902	Electronic Circuit Design	3
PD 903	Electronic board design and bring up	4
PD 904	Processor based System Design	5
PD 905	Networking & IOT	4
PD 906	Project Work	6

Other Contents

a. Course Fees :

General Candidates: Course fee is Rs. 50,000/- + GST at actuals

SC/ST Candidates: Tuition Fees are waived for SC/ST students admitted under SCSP/TSP. However they are required to remit an amount of **Rs. 8500/- as Advance caution/security deposit**. This amount will be considered as caution/security deposit and will be refunded after successful completion of the course. If the student fails to complete the course successfully this amount along with any other caution/security deposits by the student will be forfeited.

Modular wise Course Fee: Not applicable to this course

b. Registration Fee:

An amount of Rs.1000/- (including GST) (nonrefundable) should be paid at the time of registering for the course.

This fee shall be considered as part of course fee, if the student joins the course. If a student register and pay for more than one course and join for any one course, all such amount will be adjusted against the course fee payable.

If the student does not join for the registered course / any of the registered courses, fee paid shall be forfeited.

For SC/ST candidates, the registration fee is Rs.500/- and will be considered as part of caution/security deposit and will be refunded after successful completion of the course. If the candidate does not join or fails to complete the course the amount will be forfeited

However above the registration fee shall be refunded on few special cases as given below

- Course postponed and new date is not convenient for the student
- Course cancelled in advance, well before the admission date

c. Course Fee Installment Structure:

Students can pay the full fees of Rs. 59000/- (Rs. 50000/- + GST) in advance or as installments as given below

Fees	*Amount for General Candidates	Amount for SC/ST Candidates	Due Date (on or before)
Registration Fee	Rs.1000/-	Rs.500/-	During Registration
**Advance Fee	Rs. 10000/-	Rs. 8000/-	12/08/2019
1 st Installment	Rs. 19,000/-	Nil	19/08/2019
2 nd Installment	Rs. 29,000/-	Nil	18/10/2019
Total	Rs. 59,000/-	Rs. 8500/-	

		(refundable after successful completion of course)	
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* Above fees is inclusive *GST @actuals (18%)* and revision if any will be applicable at the time of payment.

** **Advance fee** - After publication of first selection list, the students in the first selection list have to pay the Advance Deposit within one week to take the provisional admission. Students in the additional selection list should pay both Advance and First installment fee together on or before counseling day

d. **Eligibility:**

M.E/M.Tech/BE/B.Tech(ECE/EEE/AEI/CSE/IT/Mechatronics/Biomedical and allied branches)

Or

M.Sc (Electronics/CS and allied branches).

e. **Number of Seats : 20**

f. **Selection of candidates :** *Selection is based on the marks in qualifying degree*

g. **Test/Interview :** *Not Applicable*

h. **Counseling/Admission :** *19/08/2019*

i. **Important Dates:**

<i>Last date for receiving completed application forms</i>	First selection list will be prepared based on the applications received on or before 07.08.2019. The additional selection list will be prepared based on the applications received on or before 13.08.2019, and excluding the applicants, included in the first selection list.
<i>Publication of first selection list in the Website http://calicut.nielit.gov.in/</i>	07.08.2019
<i>Last date for taking provisional admission by paying the advance fees (for applicants in the first selection list)</i>	12.08.2019
<i>Publication of additional selection list in our website (if there are vacant seats)</i>	13.08.2019

<i>Counseling date</i>	19.08.2019
<i>Class Commencement date</i>	19.08.2019
<i>Payment of first installment fee</i>	19.08.2019
<i>Payment of second installment fee</i>	18.10.2019

j. **Course Timings:** This program is a practical oriented one and hence there shall be more lab than theory classes. The classes and labs are from 9.30 am to 12.45 pm and 1.30 pm to 5.00 pm Monday to Friday. During project work, the timings are from 9.15 am to 5.15 pm. The theory to lab proportion is 30:70.

Internship: During the 6 months internship at Maker Village or any other industry of electronic sector, Students have to make their own arrangements for accommodation and food.

k. **Placement :** We have a placement cell, which provides placement assistance to students who qualify our courses. The course improves the knowledge and skill of the students as it deals with the latest technologies and tools used in industries. This helps the student in getting a placement by

a. Campus placement

b. Placement by companies for whom we send the students bio data and they conduct interviews at their site.

c. Students themselves attend interview at different companies and the course helps in the interview.

d. Based on the statistics from the past batches, approximately 50% students receive more than one internship offers and 100% students are placed in the core sector companies.

l. **Lab Facilities:** CREO CAD Design tools, 3D Printer, PCB design tools such as OrCAD Capture, OrCAD PCB Layout Plus, PROTEUS VSM, Digital Storage Oscilloscopes, SMD soldering station, Power Harmonic Analyzer, High Precision Digital Multi meters, PCB Fab Lab, PCB Prototyping Machine, SMT Assembly setup (Stencil Printing, Pick & Place, Reflow oven etc), Thermal Imaging Camera, AC/DC Electronic Load; ARM Based development kits for IOT like Raspberry Pi, esp32, Network Protocol Analyzers,

m. **Course Contents :**

PD 901: Industrial Design of Electronic Products (2 Weeks)

- **Product Development Process:** Product Planning, Product requirements and specifications, Concept development, Product Architecture, Project Management
- **Industrial Design:** Aesthetic, Ergonomic, Manufacturing, Cost, Thermal, EMI/EMC,
- **Quality and Testing:** DFMA, DFT, Prototyping, Patents & IPR, Product Development Economics, Quality Concepts, QFD, ISO9000, Reliability, DFMEA, Standards, certifications, regulatory compliance testing and Documentation

PD 902: Electronic Circuit Design (3 Weeks)

- **Electronics Fundamentals:** Material classification based on conductivity, basic Semi-conductor, Diodes, Characteristics of Diodes, Classification of Diodes, Transistors, Classification of Transistors, BJT characteristics, JFET & MOSFET Characteristics, Transistor Amplification Circuits, OP Amp, Basic Characteristics of OP Amp, Feedback circuits, Introductions to Digital circuits.
- **Fundamentals of Circuit Design:** Basic circuit laws , Current & voltage division Rules, Introduction to Linear and Non-linear elements, Classification of sources, Equivalent Impedance Calculations in series & parallel circuits, Basic Network Theorems, Current, voltage and Power calculations in a circuit, Diode applications, Clipping and Clamping Circuits with Diodes, Rectifier Circuits, Transistors, Selection and analysis of Components, sensing devices and display devices.
- **Power Supply design:** Introduction to low power design techniques and methodologies. Introduction to various types of power supplies. Estimation of power supply requirements and power loss in electronic products. Selection of appropriate power supplies for the given primary power sources (230VAC/Battery). Design of power scheduler, power management unit of an electronic product.

PD: 903 Electronic Board Design and Bring up (4 Weeks)

- Evolution and Classification of Printed Circuit Boards, Challenges in Modern PCB, Design and Manufacturing, PCB fabrication, methodologies (SSB, DSB and multilayer board), PCB design considerations/ design rules for analog, digital and power applications, Electromagnetic interference in electronic systems and its impact Analysis of electronic circuit from noise emission point of view (both conducted and radiated emission) cross talk and reflection behaviour of the circuit in time domain, Thermal management of electronic devices and systems.
- **Semiconductor Packages:** Single chip packages or modules. (SCM) Commonly used packages and advanced packages; Materials in packages,

Current trends in Packaging, Multichip modules (MCM) - types; System-in-package (SIP); Packaging roadmaps; Hybrid circuits.

- Introduction to high speed PCB design, Signal Integrity, Power Integrity and Thermal Analysis, Power distribution and noise, Signalling convention, terminations, Multilayer PCB design guide lines, Design of Multilayer PCB stackup, Differential pair routing, Length matching, Generation of different types of reports.

PD 904: Processor based System Design (5 Weeks)

- **C Programming:** Introduction, Data Types and storage classes, Operators, Control Statements, Arrays, Strings
- **Cortex ARM:** Introduction to ARM cortex Processor architecture and programmer's model, Introduction to Processor Instruction Set Architecture, Interrupt mechanisms and Exception handling, Cross compilation, Tool chains and Development environments, Programming using Assembly, C and Mixing the Assembly and C programming.
- Introduction to STM32 Cortex M3 hardware, Introduction to CMSIS, JTAG/SWIM based debugging using ST-LINK/V2, Introduction to STM32 Cube MX graphical configuration and generating the code in KEIL / TrueStudio.
- **Interfacing:** switches, LCD, Keyboard, IO programming, etc. through processor ports, Generating delays and PWM using timers, and Watchdog mechanism, Working with PC and RS-232, Peripheral interfacing through I2C, SPI etc, Interfacing with Memory, Providing Reset and Clock on a board, Interacting with real world using ADC and DAC.
- **Mid Term Project:** Students will be given 1 week to complete their midterm project.

PD 905: Networking & IOT (4 Weeks)

- **Networking & Communication Technologies:** Networking basics, Topologies and OSI model introduction, Transport Layer Protocols, Socket Programming, Packet Sniffing and analysis. Wifi – IEEE 802.11 standard, Wifi programming, Bluetooth – Standard, BlueZ Stack, Bluetooth Programming, Zigbee – Understanding Protocol, Target board programming with Zigbee, Wireless Security Threats.
- **IoT:** IoT Entities, IoT standards, IoT application development with embedded hardware.
- **Mobile Programming Languages:** Design & Development of Mobile User Interfaces, Mobile Application Development & Debugging, Customizing of Android Platform, Hardware Abstraction Layers, Android Framework
- **Python:** Introduction to Python, Basic Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching), Function and

Methods, Dictionaries, Functions and Functional Programming, Object Oriented, OOPs concept, Class and object, Python Libraries

- **Introduction to Image Processing:** Introduction to Image Processing toolkit of MATLAB: Image Read/Write, Histogram Equalization, Smoothing, Filtering, thresholding, Edge Detection and Segmentation, Image processing in Open CV, Features detection and description and Video Analysis

PD 906: Project (6 Weeks)

- Done as a group project where the trainees will be working on a real life problem sourced from industry/ start-ups and developing a complete product; right from identifying customer requirements and translating them into product specifications and realization of the product specifications through electronic, mechanical and industrial design within the cost and time constraints.

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