COURSE PROSPECTUS

Name of the Group: *VLSI Design Group*
Name of the Course: *PG Diploma in Electronic System Design and Manufacturing*
Course Code: *ESDM100*
Starting Date: 21st August 2017
Duration: *24 Weeks*

Preamble:
Electronics and Hardware Industry is increasingly finding applications in all sectors of the economy and thus is accepted as a key enabler in development of our country. The current growth trend and its existing contribution to the global electronics industry indicates that the share of IT Hardware and Electronics and Manufacturing in India, in terms of output and employment, has the potential to grow manifolds, driven by its emergence in the global electronics manufacturing value chain.

In order to create a conducive environment for manufacture of high technology, capital intensive semiconductors and other high tech electronic products, attract global investments as well as bridge the viability gap due to lack of adequate infrastructure and ecosystem, Government of India has announced number of initiatives in the country. To this aspect, there is also a need to ensure availability of trained human resources for this sector in order to sustain growth and to achieve the target set for this sector.

Objective of the Course:
PG Diploma in Electronics System Design and Manufacturing (ESDM) is offered to enable new Electronics graduates/post graduates and working engineers in electronic industries to specify, design, develop and test electronic products. This is offered to bridge the major gap in competencies required to design, manufacture and market Indian state-of-the art electronic products. The focus of the proposed program will be state-of-the-art electronic products that are likely to be manufactured in medium and large volumes for Indian and Global markets such as automotive, medical, consumer, industrial, entertainment, aerospace and defense. The program will not emphasize complex products produced in small numbers or very complex systems (main frame computers, telephone exchanges, data centers etc.).

Outcome of the Course:
On successful completion of the Course, the Participants shall get
- Exposure to Electronic Product Design process and Manufacturing
- Exposure to Processor/FPGA based Embedded System design
- Expertise in Embedded Software development/Digital Signal Processing /Power management/Communication Interface/IoT.

Course Structure:

The ESDM100 course contains nine modules. After completing the first eight modules, the students have to do a six weeks project towards the requirements for the award of PG Diploma in ESDM

The modules are as follows:

Module No	Module Name	Duration(Weeks)
ESDM 101	Fundamentals of Electronics	3
ESDM 102	Electronics System Packaging and Manufacturing	2
ESDM 103	Industrial Electronic Product Design	2
ESDM 104	Processor based System Design	3
ESDM 105	Embedded Software Development	2
ESDM 106	FPGA based System Design	2
ESDM 107	Communication interface of Electronics Products	2
ESDM 108	Internet of Things (IoT)	2
ESDM 109	Project Work	6
Total		24

Other Contents

a. **Course Fees** :
   General Candidates: Course fee is Rs.60,000.00 + Service Tax at actuals

   SC/ST Candidates: Tuition Fees/Examination fees are waived for SC/ST students admitted under SCSP/TSP. However they are required to remit an amount of Rs. 6,900.00 **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 for this course

   Modular admission not possible

b. **Registration Fee:** An amount of Rs. 1000/- should be paid at the time of registering for the course. The same will be considered as caution deposit on student joining the course. This advance deposit will not be refunded for a selected candidate who does not join the course.

c. **Course Fee Installment Structure**:

Students can pay the full fees of Rs.69,000.00 (Rs.60,000 + Service Tax) in advance or as installments as given below

Fees	*Amount for General Candidates	Amount for SC/ST Candidates	Due Date (on or before)
**Advance Fee	Rs. 10,000.00	Rs. 6,900.00 (refundable after successful completion of course)	08th August 2017
1st Installment	Rs.24,500.00(if advance deposit paid) else Rs.34,500.00, (ie; Rs. 30,000.00 plus Service Tax)	Nil	21st August 2017
*** 2nd Installment	Rs.34,500.00, (ie; Rs. 30,000.00 plus Service Tax)	Nil	11th November 2017

* Above fees is inclusive Service Tax @actuals (*15%*) 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 should pay both Advance and First installment fee together on or before counseling day

Fine will be applicable to late fee payment as given below

Sl. No.	Description	Fine
1	Late fee payment within two weeks after due date	18% (annually) of the outstanding dues
2	After second week of due date the candidate has to pay readmission fees along with the fine	Readmission fee `250/- plus fine of 18% (annually) of the outstanding dues
3	The candidate has to discontinue the course after third week from the due date	

d. Eligibility:
M.E/M.Tech/BE/B.Tech(ECE/EEE/AEI/CSE/IT/Biomedical/Medical Electronics, C&I, Mechatronics and allied branches) or BSc / M.Sc (Electronics/CS). Diploma students may also be considered. Graduates with appropriate experience and final year students[#] also may apply.

[#] Final year students have to include the copies of course completion certificate of their qualifying degree/ diploma or copies of the mark lists up to the last semester/ year. On the date of counseling/ admission, he/she must produce the originals of course completion certificate/ mark lists up to the last semester/year examination.

For more details about the policy refer:
http://nielit.gov.in/sites/default/files/course/NIELITCalicutPoliciesShortTermCourses.pdf

e. Number of Seats : 40

f. How to Apply :
Students are advised to apply online @http://nielit.gov.in/content/online-registration. Payment towards advance fee of Rs.1,000/- *may be paid the **SBI Collect Payment Gateway*** @http://nielit.gov.in/calicut/content/mode-payments-0

Rs.1000/- will be considered as refundable caution deposit on student joining the course, which will be refunded on successful completion of course. This advance deposit will not be refunded for a selected candidate who does not join the course.

SBI Collect Payment Gateway:

1. Please click the SBI Collect hyper link to enter the payment gateway.
2. Select Payment Category as *Course Fee*
3. Enter all the fields including amount payable and follow the instructions

The following details should reach here before the due dates.
1. Name of the Depositor
2. Name of the Student
3. Date of Payment
4. Amount Deposited
5. Purpose – Course Name:
6. UTR Number

The Institute will not be responsible for any mistakes done by either the bank concerned or by the depositor while remitting the amount into our account.

g. Selection of candidates : *Selection is based on the marks in the qualifying Degree.*

h. Test/Interview (*if applicable*) : *Not Applicable*

i. Counseling/Admission : 21st August 2017

j. Spot Admission :
If spot admission is open, spot admission will close within 15 days of Counseling/Admission of a particular course. On spot admission students should provide an undertaking saying that he/she is fully aware that he/she missed so much days of class and will not ask for extra classes or further extension of course.

k. Admission Procedure :
   Students who have been selected for test/interview/counseling/admission are required to report to the Institute on the prescribed day by 9:30 hrs along with the following

   1. Original and attested Copies of Proof of Age, Qualifications, etc
   2. One passport size photograph and one stamp size photograph for identity card.
   3. SC/ST Certificate (Original and attested copies, if applicable)
   4. Income Certificate (Original and attested copy, if applicable)

   The students on reaching the Institute are required to meet the Front Office Councilor (FOC). The FOC then directs the student to the Course Coordinator. The student gets the certificates and enrollment form verified by the Course Coordinator and then meets the FOC who shall direct the student to the Accounts for payment of fees. A student is thus admitted, attested copies of all documents shall be handed over to the Course Coordinator.

l. Discontinuing the course: No fees (including the caution deposit) under any circumstances, shall be refunded in the event of a student discontinuing the course. No certificate shall be issued for the classes attended.

   A student can however, be eligible for module certificates (applicable only for courses which provide for modular admission) which he has successfully completed provided, he/she has paid the entire course fees. This is not applicable to SC/ST candidates availing fee concession. SC/ST candidates availing fee concession are eligible for module certificates only after completing the full course with required attendance

m. Course Timings : 9.30 am to 4.45 pm

n. Location and how to reach :
   NIELIT Calicut is located very close to NIT campus and is about 22Kms from the Calicut (Kozhikode) city. A number of buses (Buses to NIT via Kunnamangalam) are available from "Palayam Bus Stand and KSRTC Bus Stand". The bus stop at our Institute is called "Panthrand" and is one stop before NIT. The bus fare is around Rs.17.00 from Calicut City to NIELIT.

   Calicut (Kozhikode) is well connected by Rail, Road and Air form different parts of the country. The maximum and minimum temperatures range between 35^0C and 20^oC.

o. Course enquiries :
   Students can enquire about the various courses either on telephone or by personal contact between 9.15 A.M. to 5.15 P.M. (Lunch time 1.00 pm to 1.30 pm) Monday to Friday.

p. Important Dates (if applicable) :

Last date for receiving completed application forms	**First selection list will be prepared based on the applications received on or before 01ˢᵗ August 2017. The additional selection list will be prepared based on the applications received on or before 08ᵗʰ August 2017, and excluding the applicants, included in the first selection list.**
*Publication of **first selection list** in our Website*	**01ˢᵗ August 2017**
*Last date for taking provisional admission by paying the **advance fees**, for applicants in the first selection list*	**08ᵗʰ August 2017**
*Publication of **additional selection list** in our website (if there are vacant seats)*	**08ᵗʰ August 2017**
Counseling date	**21ˢᵗ August 2017**
Class Commencement date	**21ˢᵗ August 2017**
Payment of first installment fees	**21ˢᵗ August 2017**
Payment of second installment fees	**11ᵗʰ November 2017**

q. Placement : *please visit http://nielit.gov.in/content/placement-3*

r. Hostel facilities :

Hostel accommodation is available for boys and girls on monthly or daily chargeable basis. The hostel fee varies from Rs.1,400 /- to Rs.1,500/-- per month depending on the type of accommodation. However, students are required to pay the hostel fees for the duration of the course for which they are seeking admission at the time of joining the course.

s. Canteen facilities :

Canteen & Mess facility is available for both boys & girls, students, those who avail mess facility should pay monthly mess fee @Rs.130/- per day. An amount of Rs.1,000/- should be paid as mess advance to the Canteen Contractor at the time of joining the mess which will be adjusted in the last month mess fee.

An amount of Rs.3,000/- should be paid as caution deposit (hostel & mess) at the time of joining the hostel which will be refunded/adjusted at the end of the course.

t. Lab Facilities :

Full-fledged labs with latest Embedded and VLSI Design Tools, High-end FPGA based embedded development boards, Digital Storage Oscilloscopes, SMD soldering station, High Precision Digital Multimeters, Xilinx, Altera and Mentor Graphics FPGA & PLD design tools, FPGA & PLD based Demo boards, ASIC Design & Verification tool suite (Front End & Back end) from Cadence and Synopsys, Scientific Computation Tool Suite from Mathworks (MATLAB &

SIMULINK) ,ARM Based development kits for IoT like Raspberry Pi, Embedded Linux Workstations, Network Protocol Analyzers,PCB design tools such as OrCAD Capture, OrCAD PCB Layout Plus, OrCAD Digital Simulator, CAD Design tools for Enclosure Design, 3D Printer etc.

u. Course Contents :

Syllabus
Module-1 (Fundamentals of Electronics)
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.

Module-2 (Electronic System Packaging and Manufacturing)

Evolution and Classification of Printed Circuit Boards, Challenges in Modern PCB Design and Manufacture, 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 behavior 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.

Module-3 (Industrial Electronic Product Design)

Development Process, Product Planning & Conceptualization, Product Architecture and Industrial Design, Product Manufacturing & Prototyping, Economic Analysis & Managing Projects. Introduction to 3-D printing and Rapid Prototyping.

Module-4 (Processor based System Design)

Introduction to ARM Processor architecture and programmer's model, Overview of Cortex Architecture, Cortex M3 Register Set and Modes, Cortex M3 Processor Core, Data Path and Instruction Decoding, ARM Cortex M3 Development Environment, Assembler and Compiler, Linkers and Debuggers, ARM, Thumb & Thumb2 instructions, Mixing ARM & Thumb Instructions, Memory hierarchy, Memory Mapping, Cache.

Programming Concepts: - High level and low level languages, Compiler, Linker & Cross compilers, running, debugging and testing of programs, Measures of program performance, Program optimization techniques.

Programming using Assembly language, C Programming: Introduction, Data Types and storage classes, Controlling program flow, Arrays, Functions, Pointers, Arrays and Pointers, Pointer to Functions and advanced topics on Pointers, Structures and Unions, Preprocessor directives, File operations, bitwise operations, Typecasting.

Cortex M3 based controller architecture, Memory mapping, Cortex M3 Peripherals – RCC, GPIO, Timer, System timer, UARTs, LCD, ADC, Cortex M3 interrupt handling – NVIC. Application development on Cortex M3 controllers.

Module-5(Embedded Software Development)
Operating System Concepts for Embedded Systems

Basic Operating System Concepts: Linux as Embedded OS, Comparison of Embedded OS, Embedded OS Tools and development, Discussion on Embedded OS Applications and products, System Calls, Linux Compiler options, Make. Internals of Linux OS: Process, Multithreading and Synchronization. Inter Process Communication: Pipe and FIFOs, Shared memory, Sockets.

Getting Linux on a device and Driver Development

Introduction to Linux Kernel source tree and compilation, Linux boot sequence, Building Kernel, Building Boot image, Linux Kernel modules and module programming, Linux Device drivers

RTOS Concepts

Introduction to Real-time systems and Embedded Real-time Systems, Discussion and Comparison of popular RTOS, Design Goals for Real-time software, Discussion on Embedded Real-time applications, Considerations for real-time programming, Task/Thread Creation and management, Inter Task/Process Communication Mechanisms, Semaphores, Message Passing, Pipes, Interrupts, Development Tools.

Porting

Building root file system, Kernel Compilation for ARM, Porting of Embedded OS on ARM.

Module-6 (FPGA based System Design)

Introduction to FPGA, HDL Refresher, Introduction to modeling & Writing Simple Test Benches, FPGA Devices, Design Flows, Principles of Combinational Circuit Design, Principles of Sequential Circuit Design, Principles of FSM Design, Principles of RTL Design, Mixing Design Styles, HDL Coding for Synthesis, Designing Memories, Modeling of Microprocessors, Designing SoC based system

Module-7 (Communication interface of Electronic Products)

Introduction to serial (wired and wireless) and parallel communication. Familiarization of Serial communication protocols: I2C, SPI Ethernet, USB, PCI and PCIe. TCP/IP communications model and functional properties of each one of the layers. Packet and file transfer using embedded web server which supports FTP/HTTP/ SMTP/ SNMP protocols.

Module-8 (Internet of Things (IOT)

Fundamentals of Wireless Technologies

Evolution of Wireless Communication, RF fundamentals, Overview of Cellular Systems, 1st, 2nd, 3rd and 4th Generation Cellular Systems.

Network Devices and the Internet of Things:

Computer networking overview: TCP/IP, IPV6, Networking devices, topologies. IoT Wireless Technologies: IoT Wireless standards, Wireless LANs: 802.11,802.11a/b/g/n, Wireless Personal Area Networks, Bluetooth, IEEE 802.15 standards, Zigbee, Sensor Networks.

IoT overview: IoT Entities, IoT standards, IoT application development with Embedded hardware.

Module-9 Project