

# M.E. VLSI DESIGN AND EMBEDDED SYSTEMS (Affiliated to Anna University, Chennai)

## PROGRAMME BROCHURE



Offered by

DEPARTMENT OF ELECTRICAL, ELECTRONICS AND COMMUNICATION ENGINEERING  
NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING AND RESEARCH  
(Ministry of Education, Govt. of India) Taramani, Chennai - 600 113, India

[www.nitttrc.ac.in](http://www.nitttrc.ac.in)



## About NITTTR, CHENNAI

National Institute of Technical Teachers Training and Research (NITTTR), Chennai was established in 1964 by the Government of India as a key catalyst institution for ensuring quality in technical education in South India comprising the States of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Telangana and Union Territory of Pondicherry. This Institute being a Resource Institute offers educational services in curriculum/material/ institutional Development, Instructional Methods, Media, Examination Reforms, Continuing Education, Distance Learning, Training and Development, Educational Psychology, Educational Management and Research. The Institute strives continuously and vigorously to achieve greater heights of excellence by actively collaborating with National and International agencies on projects and programmes aimed at quality improvement of technical education systems

Established in the year 1964, Electrical, Electronics & Communication Engineering (EE&CE) Department is organizing about 30 programmes throughout the year in 20 different areas for teachers of Polytechnic & Engineering Colleges from India. The Department is conducting Overseas Training Programmes every year for two months duration to train the International faculty members in the emerging electronics areas. Training programmes organized in the department are practically oriented to enable the participants to gain confidence in handling the subjects. The training will be given by the eminent Professors, Experts and related Software Professionals from various Universities, IITs, NITTTRs and Industries. Participants will be getting industrial exposure by arranging industrial visits and training in the industrial environment. EE&CE Department has offered customized training programmes for Industries like Andrew Yule, Visteon and has also trained PWD officials. As per NITTTRs mandate, the Department faculty members are involved in revising the curriculum of Polytechnic, University/Engineering college programme from time to time. The Department is organizing many workshops/ seminars/ conferences in emerging areas in the field of Electrical, Electronics and Communication. The Department has conducted International/National Programmes/ workshops/ seminars/ webinar in collaboration with PSC Manila and UNSECO. The Department also offers consultancy in setting up of centres of excellence and other project works. Department has purchased the latest equipment to train the faculties in the current trends.

## VISION

To serve as centre of excellence in promoting need based training programme and Research in Electrical Electronics and Communication Engineering



# MISSION

To design and develop need based training programs for the faculty of Polytechnic & Engineering Colleges and working Professionals of Industry and Government Organizations.

To offer International Training Programs on emerging areas of Electrical, Electronics and Communication Engineering for the Teachers and working professionals of various Countries under ITEC scheme Of Ministry of External Affairs, Government of India.

To develop new innovative short-term and long-term programs by collaborating with Universities and Institutes of Higher Learning for developing Electrical, Electronics and Communication Engineering Teachers to meet the requirements of Engineering Educational Institutions.

To provide support services to the Government of India schemes related to the technical and vocational education system and as entrusted by MHRD, Government of India, from time to time.

To offer research, testing services for Industries and Govt. Organizations.

To establish partnership with Industries for offering Skill based Training Programs for Industrial Personnel and Industrial Training for the faculty of Polytechnic and Engineering Colleges.

To design new instructional systems and strategies for the production of multimedia learning resources and transfer through the latest technologies including broadcasting and webcasting/ multicasting. To offer faculty exchange programs by linking with various Universities of India and abroad.

## AREAS OF SHORT - TERM COURSES CONDUCTED BY THE DEPARTMENT

### PLC and SCADA

- ▶ Industrial Automation
- ▶ Digital and Mobile Communication
- ▶ 8051 Micro Controller and its applications
- ▶ PIC 16F877 Microcontroller and its applications
- ▶ Data Communication and Networking
- ▶ MATLAB Programming for Simulation and Design
- ▶ Digital Design using Verilog and implementation using FPGA
- ▶ Graphical System Design using LabVIEW
- ▶ Digital Signal Processing
- ▶ Advanced Communication Systems
- ▶ ARM Controller LPC2148
- ▶ Power Electronics

### Verilog Programming and Implementation using FPGA

- ▶ Virtual Instrumentation
- ▶ VHDL Programming and Implementation using FPGA
- ▶ Wireless Communication
- ▶ Special Electrical Machines and Control
- ▶ Arduino and Raspberry Pi Programming
- ▶ Electrical Systems for Wind and Solar
- ▶ Sensor Applications using MyRIO
- ▶ Biomedical Electronics and IoT in Healthcare
- ▶ Electrical CAD
- ▶ Internet of Things(IoT)
- ▶ Electric Vehicle Engineering
- ▶ Circuit Simulation and PCB Design

## M.E. VLSI DESIGN AND EMBEDDED SYSTEMS

VLSI is an important skill which is required in the electronics industry whereas professionals skilled in Embedded systems are high in demand in the semiconductor and microprocessor industry. India offers lucrative jobs for the professionals trained in VLSI and Embedded systems

VLSI and Embedded systems has emerged as a one stop career destination for candidates having interest in electronics and hardware-software. This programme is not alone focusing on the emerging areas, but also develop problem analysis and design skills of the students in the domain. Industry experts also will be involved in handling classes and students will be able to interact with different industry experts. The uniqueness of this programme is to encourage the students to undergo the Industrial problem based projects. Hence the students who are undertaking these programmes will gain knowledge in solving Industry based Problems and develop expertise in research and development to cater to needs of the society. Both embedded systems and VLSI professionals have enormous job opportunities and are having high demand.

### FACULTY OF THE DEPARTMENT



**Dr. G.A. Rathy.**  
Professor and Head



**Dr. G. Kulanthaivel.**  
Professor



**Dr. P. Sivashankar.**  
Professor

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- ▶ To enrich students to excel in research leading to cutting edge technology in VLSI design and embedded systems and creating competent, innovative, and productive professionals in this field.
- ▶ To provide students with a solid foundation in digital and computer architecture principles leading to VLSI design.
- ▶ To understand the various applications and employ embedded systems to find solutions to them with good scientific and engineering knowledge so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.
- ▶ To provide students with an academic environment aware of excellence, leadership, ethical conduct, positive attitude, societal responsibilities and the lifelong learning needed for a successful professional career.
- ▶ To inculcate entrepreneurial skills in starting industries applying embedded system technologies.

**PROGRAMME OUTCOMES (POs):** On successful completion of the programme,

- ▶ Graduates will be able to apply the knowledge of computing, mathematics, science and electronic engineering for designing VLSI circuits.
- ▶ Graduates will have an ability to identify, formulate, investigate and solve the issues related to the design of VLSI and embedded systems.
- ▶ Graduates will have an ability to design and conduct experiments, perform analysis and interpret the problems of VLSI design and embedded systems.
- ▶ Graduates will be able to demonstrate the design of an embedded system, component or process as per needs and specifications.
- ▶ Graduates will demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks.
- ▶ Graduates will have the skills to use modern engineering tools, softwares and equipments to analyze problems.
- ▶ Graduates will demonstrate knowledge of professional and ethical responsibilities.
- ▶ Graduate will be able to communicate effectively in both verbal and written form.
- ▶ Graduate will show the understanding of the impact of engineering solutions on the society and also will be aware of contemporary issues.
- ▶ Graduate will develop confidence in self education and ability for lifelong learning.

Programme Educational Objectives	Programme Outcomes									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
I	✓	✓	✓	✓	✓	✓		✓	✓	✓
II		✓	✓		✓	✓				
III				✓	✓	✓	✓			
IV		✓	✓				✓	✓	✓	✓
V		✓	✓	✓				✓	✓	✓

YEAR	SEM	SUBJECTS	PROGRAM EDUCATIONAL OBJECTIVES									
			PE1	PE2	PE3	PE4	PE5	PE6	PE7	PE8	PE9	PE10
First	I	Advanced Applied Mathematics	✓	✓			✓				✓	
		Digital Integrated Circuit Design		✓	✓	✓	✓	✓				
		Introduction to Embedded Controllers		✓		✓	✓	✓			✓	
		CMOS Analog IC Design		✓	✓		✓	✓				
		Design for Testability		✓	✓	✓	✓	✓	✓	✓		
		Elective-I										
	II	Analog & Digital System Design Lab			✓	✓	✓	✓	✓	✓		✓
		Real Time Embedded Systems		✓		✓	✓	✓			✓	
		VLSI Architectures for System Design		✓	✓	✓	✓	✓	✓		✓	✓
		Hardware-Software Co-design of Embedded system		✓	✓	✓	✓	✓	✓		✓	✓
		Low Power VLSI Design		✓	✓	✓	✓	✓			✓	✓
		Elective-II										
		Elective-III										
	Embedded Systems Lab			✓	✓	✓	✓	✓	✓		✓	
		Technical Seminar and Report Writing										
Second	III	SoC design for Embedded System		✓	✓	✓	✓	✓	✓		✓	✓
		Elective-IV										
		Elective-V										
		Project Work Phase-I				✓		✓		✓		✓
	IV	Project Work Phase-II				✓		✓		✓		✓

The programme will have Core courses, Elective courses and Project works. The project may also have seminar, practical/Industrial training summer project.

#### SEMESTER - I

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	MA7152	Advanced Applied Mathematics	FC	4	4	0	0	4
2.	VE7103	Digital Integrated Circuit Design	PC	3	3	0	0	3
3.	VE7104	Introduction to Embedded Controllers	PC	3	3	0	0	3
4.	VE7101	CMOS Analog IC Design	PC	3	3	0	0	3
5.	VE7102	Design for Testability	PC	3	3	0	0	3
6.		Elective-I		3	3	0	0	3
<b>PRACTICALS</b>								
7.	VE7111	Analog and Digital System Design Lab	PC	4	0	0	4	2
<b>TOTAL</b>				<b>23</b>	<b>19</b>	<b>0</b>	<b>4</b>	<b>21</b>

### SEMESTER - II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	NE7251	Real Time Embedded System	PC	3	3	0	0	3
2.	VE7202	VLSI Architectures for System Design	PC	3	3	0	0	3
3.	VE7201	Hardware Software Co Design of Embedded System	PC	3	3	0	0	3
4.	VL7252	Low Power VLSI Design	PC	3	3	0	0	3
5.		Elective-II	PE	3	3	0	0	3
6.		Elective-III	PE	3	3	0	0	3
<b>PRACTICALS</b>								
7.	VE7211	Embedded Systems Lab	PC	4	0	0	4	2
8.	VE7212	Technical Seminar and Report Writing	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>24</b>	<b>18</b>	<b>0</b>	<b>6</b>	<b>21</b>

### III SEMESTER

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	VE7301	SoC Design for Embedded System	PC	3	3	0	0	3
2.		Elective-IV	PE	3	3	0	0	3
3.		Elective-V	PE	3	3	0	0	3
<b>PRACTICALS</b>								
4.	VE7311	Project Work Phase – I	EEC	12	0	0	12	6
<b>TOTAL</b>				<b>22</b>	<b>9</b>	<b>0</b>	<b>12</b>	<b>15</b>

### IV SEMESTER

SL. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>PRACTICALS</b>								
1.	VE7411	Project Work Phase – II	EEC	24	0	0	24	12
<b>TOTAL</b>				<b>24</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>12</b>



### FOUNDATION COURSES (FC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>PRACTICALS</b>								
1.		Advanced Applied Mathematics	FC	4	4	0	0	4
<b>TOTAL</b>				<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

### PROFESSIONAL CORE (PC)

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Introduction to Embedded Controllers	PC	3	3	0	0	3
2.		Digital Integrated Circuit Design	PC	3	3	0	0	3
3.		CMOS Analog IC Design	PC	3	3	0	0	3
4.		Design For Testability	PC	3	3	0	0	3
5.		Real Time Embedded Systems	PC	3	3	0	0	3
6.		VLSI Architectures for System Design	PC	3	3	0	0	3
7.		Hardware - Software Co-design of Embedded system	PC	3	3	0	0	3
8.		Low Power VLSI Design	PC	3	3	0	0	3
9.		SoC design for Embedded System	PC	3	3	0	0	3
10.		Analog & Digital System Design Lab	PC	4	0	0	4	2
11.		Embedded Systems Lab	PC	4	0	0	4	2

**PROFESSIONAL ELECTIVES (PE)**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	NE7072	ASIC Design	PE	3	3	0	0	3
2.	VL7073	VLSI Signal Processing	PE	3	3	0	0	3
3.	VE7016	RF IC Design	PE	3	3	0	0	3
4.	VE7011	MEMS and Microsystems	PE	3	3	0	0	3
5.	VE7013	Nano Electronics	PE	3	3	0	0	3
6.	VE7018	VLSI For Wireless Communication	PE	0	3	0	0	3
7.	VE7015	Parallel and Reconfigurable Architectures	PE	3	3	0	0	3
8.	VE7001	Advanced CMOS Analog IC Design	PE	3	3	0	0	3
9.	NE7074	Computational Intelligence	PE	3	3	0	0	3
10.	AP7073	Design and Analysis of Computer Algorithms	PE	3	3	0	0	3
11.	VE7007	Distributed Embedded Computing	PE	3	3	0	0	3
12.	VE7017	Robotics	PE	3	3	0	0	3
13.	VE7002	Advanced Embedded System Design	PE	3	3	0	0	3
14.	NE7071	Adaptive Signal Processing	PE	3	3	0	0	3
15.	VE7014	Network on Chip Design	PE	3	3	0	0	3
16.	VE7009	Embedded C	PE	3	3	0	0	3
17.	VE7003	Algorithm For VLSI Design Automation	PE	3	3	0	0	3
18.	VE7008	Embedded Automotive Systems	PE	3	3	0	0	3
19.	VE7004	Computer Aided Design of VLSI Systems	PE	3	3	0	0	3
20.	VE7005	Design of Embedded Control System	PE	3	3	0	0	3
21.	VE7012	Multi Core Architectures and Programming	PE	3	3	0	0	3
22.	VE7010	Embedded Networking	PE	3	3	0	0	3
23.	NE7076	Digital Image and Video Processing	PE	3	3	0	0	3
24.	VE7006	Digital Signal Processors and Architectures	PE	3	3	0	0	3

**EMPLOYABILITY ENHANCEMENT COURSES (EEC)**

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Technical Seminar and Report Writing	EEC	2	0	0	2	1
2.		Project Work Phase –I	EEC	12	0	0	12	6
3.		Project Work Phase –II	EEC	24	0	0	24	12

## CREDITS

The minimum prescribed credits required for the award of the degree shall be within the limits :  
65 to 75 (As per Anna University, Chennai)

## UNIVERSITY EXAMINATIONS

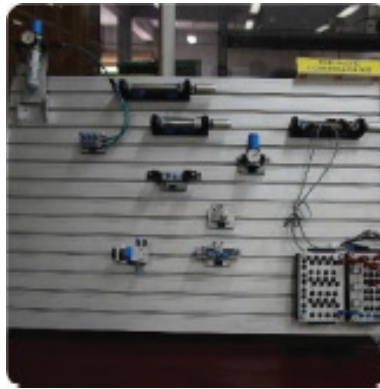
There shall be an End- Semester Examination of 3 hours duration in each course will be conducted by Anna University, Chennai.



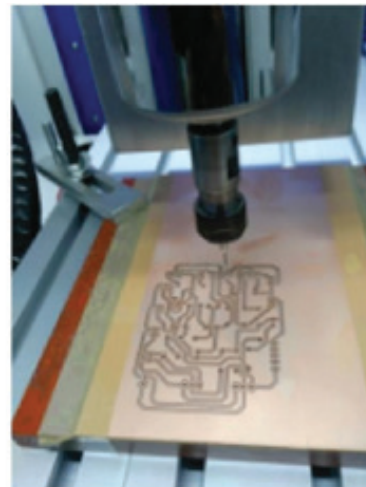
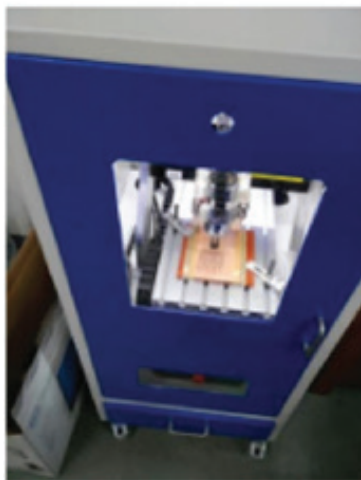
## Recruiters for Embedded Systems and VLSI Professionals

Intel	Red Pine Signals
NVIDIA	Wipro VLSI
AMD	Bosch
Texas Instruments	Cisco
Qualcomm	Juniper Networks
Samsung	Google
Analog Devices	Sasken
LSI	Tata Elxsi
Broadcom	Pace
Microchip	Philips

## INDUSTRIAL INSTRUMENTATION & PNEUMATICS LAB



## ELECTRONICS DESIGN AND PCB DESIGN LAB



## INTERNET OF THINGS (IoT) & CYBER PHYSICAL SYSTEMS LAB



POWER ELECTRONICS LAB



COMMUNICATION ENGINEERING LAB



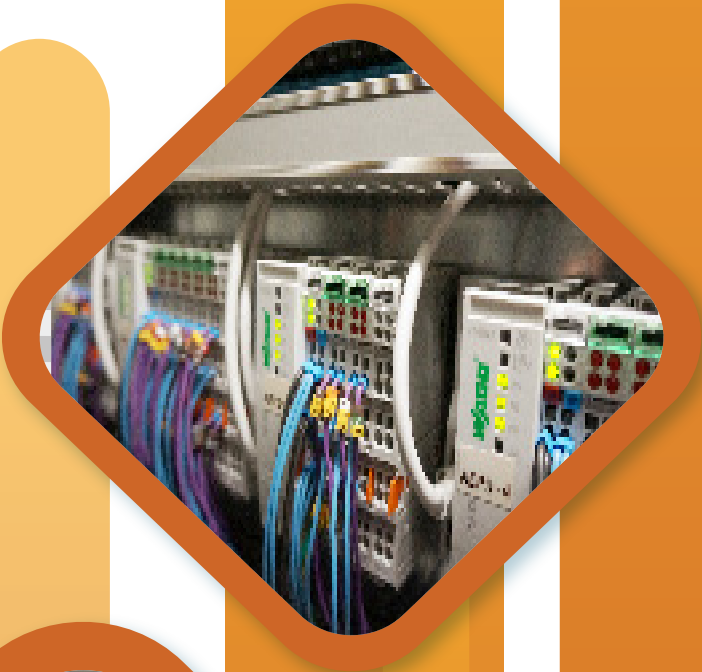
BIOMEDICAL ELECTRONICS LAB



VLSI LAB



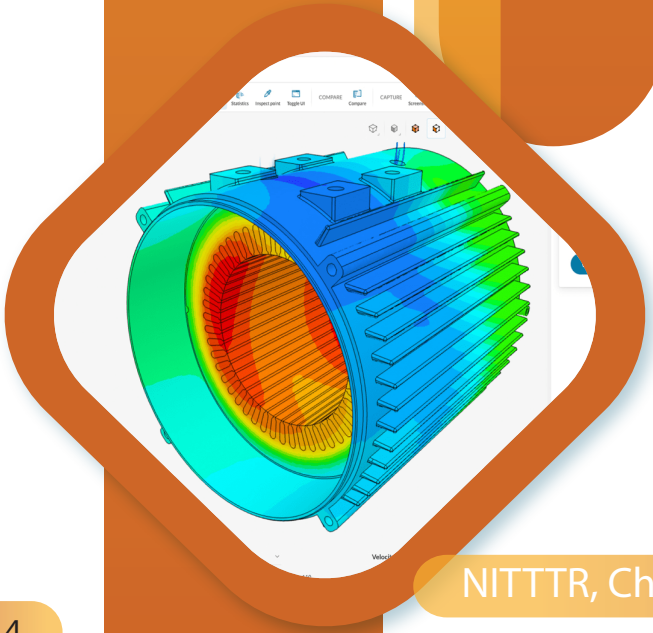
## PROGRAMMABLE LOGIC CONTROLLER (PLC) LAB



## EMBEDDED SYSTEMS LAB



## APPLICATION SOFTWARE AND SIMULATION LAB





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