



ACADEMIC YEAR (2021-2022)

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			<b>J K K Munirajah college of Technology, T.N.Palayam</b>		<b>Metric No 1.3.2</b>	
S.No	Name of the course	course code	programme offering	Contents mapping to		Number of students
				project work	internship	
<b>(2021-2022) Regulation-2021</b>						
1	Semiconductor Devices and Modeling	AP4153	M.E. Applied Electronics		✓	3
2	Industrial Internet of Things	AP4251	M.E. Applied Electronics		✓	3
3	Embedded Systems	AP4203	M.E. Applied Electronics		✓	3

  
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**GOBI (Tk), ERODE (Dt).**



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T.N.Palayam (Po), Gobi (Tk), Erode (Dt) – 638 506



**M.E Applied Electronics**

**ACADEMIC YEAR 2021-2022**

S.NO	REGISTER NUMBER	STUDENT NAME	PROJECT WORK	INTERNSHIP
1	731221401001	DIVYA R		✓
2	731221401002	SEETHASUGANTHI S		✓
3	731221401004	SUDEEP J		✓

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**M.E Applied Electronics**

S.NO	Name of the Course that Include Experimental Learning through project Work/Internship/Field Visit
1	Semiconductor Devices and Modeling
2	Industrial Internet of Things
3	Embedded Systems

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**COURSE OBJECTIVES:**

- To acquire the fundamental knowledge and to expose to the field of semiconductor theory and devices and their applications.
- To gain adequate understanding of semiconductor device modelling aspects, designing devices for electronic applications
- To acquire the fundamental knowledge of different semiconductor device modelling aspects.

**UNIT I MOS CAPACITORS**

9

Surface Potential: Accumulation, Depletion, and Inversion, Electrostatic Potential and Charge Distribution in Silicon, Capacitances in an MOS Structure, Polysilicon-Gate Work Function and Depletion Effects, MOS under Nonequilibrium and Gated Diodes, Charge in Silicon Dioxide and at the Silicon-Oxide Interface, Effect of Interface Traps and Oxide Charge on Device Characteristics, High-Field Effects, Impact Ionization and Avalanche Breakdown, Band-to-Band Tunneling, Tunneling into and through Silicon Dioxide, Injection of Hot Carriers from Silicon into Silicon Dioxide, High-Field Effects in Gated Diodes, Dielectric Breakdown.

**UNIT II MOSFET DEVICES**

9

Long-Channel MOSFETs, Drain-Current Model, MOSFET I-V Characteristics, Subthreshold Characteristics, Substrate Bias and Temperature Dependence of Threshold Voltage, MOSFET Channel Mobility, MOSFET Capacitances and Inversion-Layer Capacitance Effect, Short-Channel MOSFETs, Short-Channel Effect, Velocity Saturation and High-Field Transport Channel Length Modulation, Source-Drain Series Resistance, MOSFET Degradation and Breakdown at High Fields

**UNIT III CMOS DEVICE DESIGN**

9

CMOS Scaling, Constant-Field Scaling, Generalized Scaling, Nonscaling Effects, Threshold Voltage, Threshold-Voltage Requirement, Channel Profile Design, Nonuniform Doping, Quantum Effect on Threshold Voltage, Discrete Dopant Effects on Threshold Voltage, MOSFET Channel Length, Various Definitions of Channel Length, Extraction of the Effective Channel Length, Physical Meaning of Effective Channel Length, Extraction of Channel Length by C-V Measurements.

**UNIT IV BIPOLAR DEVICES**

9

n-p-n Transistors, Basic Operation of a Bipolar Transistor, Modifying the Simple Diode Theory for Describing Bipolar Transistors, Ideal Current-Voltage Characteristics, Collector Current, Base Current, Current Gains, Ideal IC-VCE Characteristics, Characteristics of a Typical n-p-n Transistor, Effect of Emitter and Base Series Resistances, Effect of Base-Collector Voltage on Collector Current, Collector Current Falloff at High Currents, Nonideal Base Current at Low Currents, Bipolar Device Models for Circuit and Time-Dependent Analyses Basic dc Model, Basic ac Model, Small-Signal Equivalent-Circuit Model, Emitter Diffusion Capacitance, Charge-Control Analysis, Breakdown Voltages, Common-Base Current Gain in the Presence of Base-Collector Junction Avalanche, Saturation Currents in a Transistor.

**UNIT V MATHEMATICAL TECHNIQUES FOR DEVICE SIMULATIONS**

9

Poisson equation, continuity equation, drift-diffusion equation, Schrodinger equation, hydrodynamic equations, trap rate, finite difference solutions to these equations in 1D and 2D space, grid

  
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generation.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

Upon completion of this course, the students will be able to

**CO1:** Explore the properties of MOS capacitors.

**CO2:** Analyze the various characteristics of MOSFET devices.

**CO3:** Describe the various CMOS design parameters and their impact on performance of the device.

**CO4:** Discuss the device level characteristics of BJT transistors.

**CO5:** Identify the suitable mathematical technique for simulation.



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AP4251

**INDUSTRIAL INTERNET OF THINGS**

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3 0 0 3

**COURSE OBJECTIVES:**

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using IoT
- To apply the concept of IOT in the real world scenario

**UNIT I INTRODUCTION AND ARCHITECTURE OF IoT 9**

Introduction – Definition and characteristics of IoT – Physical and Logical Design of IoT - Communication models and APIs - Challenges in IoT - Evolution of IoT- Components of IoT - A Simplified IoT Architecture – Core IoT Functional Stack.

**UNIT II INDUSTRIAL IoT 9**

IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models, Industrial IoT- Layers: IIoT Sensing, IIoT Processing, IIoT Communication, IIoT Networking

**UNIT III IIOT ANALYTICS 9**

Big Data Analytics and Software Defined Networks, Machine Learning and Data Science, Julia Programming, Data Management with Hadoop

**UNIT IV IOT SECURITY 9**

Industrial IoT: Security and Fog Computing - Cloud Computing in IIoT, Fog Computing in IIoT, Security in IIoT

**UNIT V CASE STUDY 9**

Industrial IOT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies: Milk Processing and Packaging Industries, Manufacturing Industries

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES:**

Upon completion of this course, student will be able to


**CO1:** Understand the basic concepts and Architectures of Internet of Things.

**CO2:** Understand various IoT Layers and their relative importance.

**CO3:** Realize the importance of Data Analytics in IoT.

**CO4:** Study various IoT platforms and Security

**CO5:** Understand the concepts of Design Thinking.

  
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## **PRACTICAL LIST:**

### **Exercise - 1**

Comparative study of software development tools and design steps with respect to FPGA based and Non - FPGA based (defined logic) embedded system development.

(For Example: consider any Spartan FPGA board for FPGA based Embedded System Consider any cortex- M based board for Non - FPGA based Embedded system)

### **Exercise - 2**

Implement adder and decoder logic blocks in any one of the FPGA chip based development board.

### **Exercise - 3**

Design and development of UART protocol logic block in any one of FPGA chip based development board.

### **Exercise - 4**

Consider on board LEDS ( any four) and timer logic block of cortex- M board. Write a program which enables LEDS to glow in different timing.

### **Exercise - 5**

Consider on board switches and (2x16) LCD display develop a program which displays the status of switch activation.

### **Exercise - 6**

Demonstrate GPIO based I/O interfacing by considering LM 35 temperature sensor and cortex- M board.

### **Exercise - 7**

Development of one interfacing scheme which transmits data from one cortex- M board to another cortex- M board using on chip CAN logic blocks.

### **Exercise - 8**

Consider on board EPROM IC of Cortex- M board by utilizing on chip I2c logic block transmit data to EPROM IC and receive stored data from EPROM IC.

### **Exercise - 9**

Consider on board LEDs (4 Nos) of Cortex - M board. Demonstrate time management service concept of RTOS for glowing all four LEDS in different timings.

### **Exercise - 10**

Consider two ultrasonic sensors which are interfaced with cortex- M board. Both are located some distance ( 2 meters) apart vertically so that the system can identify the movement of object in term of distance. consider data reception and display of each sensor as two different tasks by RTOS. Establish a RTOS based system to recognize the height of moving object.

Objective:

- a. Able to understand embedded system design flow in FPGA chip based and Non - FPGA chip based embedded development boards.
- b. Able to create simple logic blocks in FPGA chip based boards.
- c. Able to understand interfacing scheme for Non - FPGA board scheme for Non - FPGA board
- d. Able to utilize RTOS functions for interfacing practice


## **COURSE OUTCOMES:**

At the end of the course the student will be:

**CO1:** Able to design an Embedded system

**CO2:** Understand a general and single purpose processor

**CO3:** Explain different protocols

  
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ELECTRONICS COMMUNICATION &lt;jkkmctece2013@gmail.com&gt;

**INTERNSHIP REQUISITION**

2 messages

**ELECTRONICS COMMUNICATION** <jkkmctece2013@gmail.com>  
To: ETS ACADEMY Erode <etsacademyerode@gmail.com>

Mon, Apr 25, 2022 at 09:35 AM

Sir,

On behalf of J.K.K.Munirajah College of Technology, we wish to request for permission to do **Internship training** at your company ETS Academy.

We wish to undertake our students an internship training at your company from 02.05.2022 to 07.05.2022 to acquire practical knowledge. Our academic curriculum focuses on engaging students in practical experiences to observe the implementation of what they studied in college. We believe that your company will give relevant knowledge during this visit.

The students R.Divya, S.Seethasuganthi and J.Sudeep are intend to participate in this Internship. Please allow our students to do an Internship at your company and meet your skilled employee. Thank you in advance.

With Regards,  
HoD/ECE


**ECE DEPARTMENT****ECLON WELCOMES U ALL..** **INTERNSHIP.pdf**  
56K**ETS ACADEMY Erode** <etsacademyerode@gmail.com>  
To: ELECTRONICS COMMUNICATION <jkkmctece2013@gmail.com>

Tue, Apr 26, 2022 at 02:15 PM

Dear Sir,

We are delighted to accept the request of **internship** for your students with our company. Students after completing their internship, all the students, will have to submit a detailed report on their internship. This report will mark completion of their internship and then the company will issue them an Internship Certificate.

Best Regards,  
**ETS ACADEMY Erode**

  
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# CERTIFICATE

OF

## Appreciation



Date: 07.05.2022

THIS CERTIFICATE IS PROUDLY PRESENTED TO  
**R.DIVYA,**

Dept Of ECE, J.K.K Munirajah College of Technology  
has successfully completed the **internship on IOT and  
Embedded systems** from 02.05.2022 to 07.05.2022 at  
ETS ACADEMY, ERODE.

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CERTIFICATEID:A002834



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## Appreciation



Date: 07.05.2022

THIS CERTIFICATE IS PROUDLY PRESENTED TO  
**S.SEETHASUGANTHI,**

Dept Of ECE, J.K.K Munirajah College of Technology  
has successfully completed the **internship on IOT and  
Embedded systems** from 02.05.2022 to 07.05.2022 at  
ETS ACADEMY, ERODE.

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Date: 07.05.2022

THIS CERTIFICATE IS PROUDLY PRESENTED TO  
**J.SUDEEP,**

Dept Of ECE, J.K.K Munirajah College of Technology  
has successfully completed the **internship on IOT and  
Embedded systems** from 02.05.2022 to 07.05.2022 at  
ETS ACADEMY, ERODE.

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**MSME**  
MICRO, SMALL & MEDIUM ENTERPRISES  
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*J. Sudheep*

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