



<b>Department of Electronics and Communication Engineering</b>	<b>LP: EC22602</b>
<b>B.E/B.Tech/M.E/M.Tech : ECE</b> Regulation: <b>2022 (Autonomous)</b>	<b>Rev. No: 00</b>
<b>PG Specialisation : NOT APPLICABLE</b>	<b>Date: 21/01/2025</b>
<b>Sub. Code / Sub. Name : EC22602 /Embedded Systems and IoT Design</b>	
<b>Unit : I</b>	

**Unit Syllabus: INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS (9)**

Concept of RISC, RISC vs CISC, RISC-V Architecture – Pipeline – RISC-V Ecosystem – Applications of RISC-V in Embedded Systems, ARM Processor Fundamentals, Instruction Set and Programming using ARM Processor, Embedded system design process – Design example.

**Objective:** To study the architecture and programming of ARM processors

Session No.	Topics to be covered	Ref	Teaching Method
1.	Introduction to Embedded Computing	2	PPT/ICT
2.	Concept of RISC, RISC vs CISC	9	PPT/ICT
3.	RISC-V Architecture – Pipeline	9	PPT/ICT
4.	RISC-V Ecosystem - Applications of RISC-V in Embedded Systems	9	PPT/ICT
5.	ARM Processor Fundamentals	1,6	PPT/ICT
6.	ARM Processor - Instruction Set	1,6	PPT/ICT
7.	Programming using ARM Processor	1,6	PPT/ICT
8.	Embedded system design process	2	PPT/ICT
9.	Design example	2	PPT/ICT

**Content beyond the Syllabus: NIL**

\* Session duration: 50 minutes



**Sub. Code / Sub. Name : EC22602 /Embedded Systems and IoT Design**

**Unit : II**

**Unit Syllabus: ARDUINO PROGRAMMING**

**(9)**

Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output from Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino.

**Objective:** To learn Arduino programming

Session No.	Topics to be covered	Ref	Teaching Method
10.	Introduction to Arduino – Types of Arduino	4	PPT/ICT
11.	Arduino Toolchain	10	PPT/ICT
12.	Arduino Programming Structure	4	PPT/ICT
13.	Sketches – Pins – Input/Output from Pins Using Sketches	4	PPT/ICT
14.	Introduction to Arduino Shields	4	PPT/ICT
15.	Integration of Sensors and Actuators with Arduino	4	PPT/ICT
16.	Integration of Sensors and Actuators with Arduino	4	PPT/ICT
17.	Integration of Sensors and Actuators with Arduino	4	PPT/ICT
18.	Integration of Sensors and Actuators with Arduino	4	PPT/ICT

**Content beyond the Syllabus: NIL**

\* Session duration: 50 mins



**Sub. Code / Sub. Name : EC22602 /Embedded Systems and IoT Design**

**Unit : III**

**Unit Syllabus: IOT COMMUNICATION AND OPEN PLATFORMS (9)**

Concept of IoT Devices – IoT Configurations – Basic Components–IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud

**Objective:** To get familiarized on IoT based industrial automation

Session No.	Topics to be covered	Ref	Teaching Method
19.	Concept of IoT Devices	11	PPT/ICT
20.	IoT Configurations- Basic Components	11	PPT/ICT
21.	IoT Communication Models and APIs	3	PPT/ICT
22.	IoT Communication Protocols - Bluetooth – WiFi	7	PPT/ICT
23.	IoT Communication Protocols - ZigBee – GPS – GSM modules	7	PPT/ICT
24.	Open Platform (like Raspberry Pi) – Architecture	11	PPT/ICT
25.	Programming Raspberry Pi -Interfacing	11	PPT/ICT
26.	Programming Raspberry Pi - Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins	11	PPT/ICT
27.	Connecting to the Cloud	11	PPT/ICT

**Content beyond the Syllabus: NIL**

\* Session duration: 50 mins



**Sub. Code / Sub. Name : EC22602 /Embedded Systems and IoT Design**

**Unit : IV**

**Unit Syllabus: IOT IMPLEMENTATION RESOURCES**

**(9)**

Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based application through embedded system platform, Implementing-IoT concepts with python, Implementation of IoT with Raspberry Pi.

**Objective:** To explore various IoT implementation tools

Session No.	Topics to be covered	Ref	Teaching Method
28.	Introduction to Python	12	PPT
29.	Introduction to different IoT tools	11	PPT
30.	Developing applications through IoT tools	11	PPT
31.	Developing applications through IoT tools	11	PPT
32.	Developing sensor-based application through embedded system platform	11	PPT
33.	Developing sensor-based application through embedded system platform	11	PPT
34.	Implementing IoT concepts with python	12	PPT
35.	Implementation of IoT with Raspberry Pi	11	PPT
36.	Implementation of IoT with Raspberry Pi	11	PPT
<b>Content beyond the Syllabus: NIL</b>			

\* Session duration: 50 mins



**Sub. Code / Sub. Name : EC22602 /Embedded Systems and IoT Design**

**Unit : V**

**Unit Syllabus: APPLICATIONS AND CASE STUDIES**

**(9)**

Design and Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Healthcare– Logistics

**Objective:** To apply the concept of Internet of Things in real world scenario

Session No.	Topics to be covered	Ref	Teaching Method
37.	Design and Development of IoT Applications	3,7	PPT/ICT
38.	Design and Development of IoT Applications	3,7	PPT/ICT
39.	Home Automation	3	PPT/ICT
40.	Smart Agriculture	3	PPT/ICT
41.	Smart Cities	3,7	PPT/ICT
42.	Smart Cities	3	PPT/ICT
43.	Healthcare	3	PPT/ICT
44.	Logistics	3	PPT/ICT
45.	IOT use cases for transportation- Connected cars and fleets	3	PPT/ICT

**Content beyond the Syllabus:** IOT use cases for transportation- Connected cars and fleets

\* Session duration: 50 mins



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**TEXT BOOKS:**

1. Cem Unsalan, Huseyin Deniz Gurhan, Mehmet Erkin Yucel, "Embedded System Design with ARM Cortex-M Microcontrollers: Applications with C, C++ and MicroPython", Springer, 2022.
2. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
3. Arshdeep Bahga, Vijay Madiseti, "Internet of Things – A hands-on approach", Universities Press, 2015.
4. Ryan Turner, Arduino Programming: 3 Books in 1 - The Ultimate Beginners, Intermediate and Expert Guide to Master Arduino Programming, Nelly B.L. International Consulting Limited, 2020.

**REFERENCES:**

5. Michael J. Pont, "Embedded C", Pearson Education, 2007.
6. Andrew N. Sloss, D. Symes, C. Wright, "Arm System Developer's Guide", Morgan Kauffman/ Elsevier, 2006.
7. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things: David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press, 2017.
8. Constandinos X. Mavromoustakis, George Mastorakis, Jordi Mongay Batalla, "Internet of Things (IoT) in 5G Mobile Technologies", Springer International Publishing Switzerland 2016.
9. Jim Ledin, "Modern Computer Architecture and Organization", Packt Publishing, 2020.
10. J.M.Hughes, "Arduino: A Technical Reference: A Handbook for Technicians, Engineers, and Makers", O'Reilly Media, Inc.2016.
11. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press, 2021.
12. Gary Smart, "Practical Python Programming for IoT", Packt Publishing, 2020.



	Prepared by	Approved by
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Name	<b>Ms.K.S. Subhashini, Mr.S.P.Sivagnana Subramanian, Ms.K.Bhuvaneshwari</b>	Dr.G.A.Sathishkumar
Designation	Assistant Professor	Professor & HOD - ECE
Date	21/01/2025	21/01/2025
Remarks*:		
Remarks*:		

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD