DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
EECEVAC04 - Embedded System Design

UNIT I : INTRODUCTION Core of the embedded system, Memory, Sensors (resistive, optical, position, thermal) and Actuators (solenoid valves, relay/switch, opto-couplers),Communication Interface, Embedded firmware (RTOS, Drivers, Application programs), Power-supply (Battery technology, Solar), PCB and Passive components, Safety and reliability, environmental issues. Ethical practice. Characteristics and quality attributes (Design Metric) of embedded system. Real time system's requirements, real time issues, interrupt latency. Embedded Product development life cycle, Program modeling concepts: DFG, FSM, Petri-net, UML

UNIT II : Embedded Hardware and Design : Introduction to ARM-v7-M (Cortex-M3), ARM-v7-R (CortexR4) and comparison in between them.

UNIT III: Embedded Serial Communication Study of basic communication protocols like SPI, SCI (RS232, RS485), I2C, CAN, Field-bus (Profibus), USB (v2.0), Bluetooth, Zig-Bee, Wireless sensor network.

UNIT IV: Embedded Software, Firmware Concepts and Design Embedded C-programming concepts (from embedded system point of view):Optimizing for Speed/Memory needs, Interrupt service routines, macros, functions, modifiers, data types, device drivers, Multithreading programming.(Laboratory work on J2ME Java mobile application). Basic embedded C programs/applications for ARM-v7, using ARM-GCCtool-chain, Emulation of ARM-v7 (e.g. using QEMU), and Linux porting onARM-v7 (emulation) board

UNIT V : ARDUINO   Introduction and Familiarization - Hardware Overview - Download and Install the Arduino IDE - Arduino IDE and Sketch Overview - Understanding Arduino data types, Variables and constants, Arrays, Operators, Control Statements, Simple Projects: Automated Plant Watering System

REFERENCES

1. K.V. Shibu, "Introduction to Embedded Systems", McGraw Hill Education India Private Limited; Second edition (1 July 2017).
2. Tony Givargis Frank Vahid, "Embedded System Design – A unified hardware and software introduction", John Wiley; Student edition (1 January 2006).
3. Rajkamal (TMH) "Embedded Systems - Architecture, Programming and Design", McGraw Hill Education; Third edition (1 July 2017)

4. Lyla B Das, "Embedded Systems: An Integrated Approach", Pearson Education India; 1st edition (1 January 2012).
5. Steve Heath, "Embedded System design", Newnes; 2nd edition (30 October 2002).
6. James Arthur, "Arduino: The complete guide to Arduino for beginners, including projects, tips, tricks, and programming", Ingram Publishing (31 March 2020).