MC5202 EMBEDDED SYSTEMS

DETAILED SYLLABUS

OBJECTIVES:

- To understand the architecture of embedded processors, microcontrollers, and peripheral devices.
- To appreciate the nuances of programming micro-controllers in assembly for embedded systems.
- To understand the challenges in developing operating systems for embedded systems.
- To learn about programming these systems in high-level languages such as C.

UNIT I EMBEDDED COMPUTING

Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

UNIT II MEMORY AND INPUT / OUTPUT MANAGEMENT

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupt handling.

UNIT III PROCESSES AND OPERATING SYSTEMS

Multiple tasks and processes – Context switching – Scheduling policies – Inter process communication mechanisms – Performance issues.

UNIT IV EMBEDDED C PROGRAMMING

Programming embedded systems in C – C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues.

UNIT V EMBEDDED SYSTEM DEVELOPMENT

Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Introduction to Internet of Things - Design issues – Design methodologies – Case studies using IoT– Complete design of example systems.

REFERENCES:

1. Andrew N Sloss, D. Symes, C. Wright, “ARM System Developers Guide”, Morgan Kauffman/ Elsevier,2006. (unit 4)

2. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015

3. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. Mc Kinlay, “The 8051

4. Microcontroller and Embedded Systems”, Pearson Education, Second edition, 2007

5. Michael J. Pont, “Embedded C”, Pearson Education, 2007.

6. Steve Heath, “Embedded System Design”, Elsevier, 2005.

7. Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”, Elsevier, 2006.