

IT8072 EMBEDDED SYSTEMS

DETAILED SYLLABUS

OBJECTIVES:

- To learn the architecture and programming of ARM processor.
- To become familiar with the embedded computing platform design and analysis.
- To get thorough knowledge in interfacing concepts
- To design an embedded system and to develop programs

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS

Complex systems and microprocessors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III SENSOR INTERFACING WITH ARDUINO

Basics of hardware design and functions of basic passive components-sensors and actuators
Arduino code - library file for sensor interfacing-construction of basic applications

UNIT IV EMBEDDED FIRMWARE

Reset Circuit, Brown-out Protection Circuit-Oscillator Unit - Real Time Clock-Watchdog Timer
- Embedded Firmware Design Approaches and Development Languages.

UNIT V EMBEDDED C PROGRAMMING

Introduction-Creating hardware delays using Timer 0 and Timer 1-Reading Switches-Adding Structure to the code-Generating a minimum and maximum delay-Example: Creating a portable hardware delay- Timeout Mechanisms-Creating loop timeouts-Testing loop timeouts- hardware timeouts-Testing a hardware timeout

TEXT BOOKS:

1. Marilyn Wolf, —Computers as Components - Principles of Embedded Computing System Design II, Third Edition —Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (unit I & II)
2. <https://www.coursera.org/learn/interface-with-arduino#syllabus> (Unit III)
3. Michael J. Pont, —Embedded C II, 2nd Edition, Pearson Education, 2008. (Unit IV & V)

REFERENCES:

1. Shibu K.V, —Introduction to Embedded SystemsII, McGraw Hill.2014
2. Jonathan W. Valvano, —Embedded Microcomputer Systems Real Time InterfacingII, Third Edition Cengage Learning, 2012
- 3 Raj Kamal, —Embedded Systems-Architecture, programming and designII, 3edition, TMH.2015
4. Lyla, —Embedded SystemsII, Pearson, 2013
6. David E. Simon, —An Embedded Software PrimerII, Pearson Education,2000.