

Nirma University
Institute of Technology
B. Tech (Instrumentation and Control Engineering)
Semester: V/VI

L	T	P	C
2	0	2	3

(Open Elective for other than IC Eng.)

Course Code	2ICOE52
Course Title	System Design using ARM Controller

Course Outcomes (COs) :

At the end of the course, students will be able to –

1. explain the architecture of ARM controller
2. program ARM microcontroller using various programming techniques
3. interface various input/ output devices with ARM controller
4. design ARM processor based embedded applications

Syllabus:

Teaching Hours

UNIT 1: Introduction

04

The RISC design philosophy, the ARM design philosophy, embedded system hardware, embedded system software

UNIT 2: Introduction to the ARM processor instruction Set

03

Data processing instructions, branch instructions, load-store instructions, software interrupt instruction, program status register instructions, loading constants, ARMv5E extensions, conditional execution

UNIT 3: C Programming and assembly programming overview

05

Writing C programs, function creation, writing assembly code, profiling and cycle counting, instruction scheduling, register allocation, conditional execution, looping constructs

UNIT 4: ARM processor modules

05

ARM peripheral programming, Fast and Slow GPIO programming, D/A converter module, A/D converter module, SPI module, I2C module, PWM module, ARM cortex series programming



UNIT 5: Interfacing with ARM controllers**08**

Interfacing with push buttons and various types of switches, Interfacing with various types of analog sensors like temperature, flow, pressure etc. Interfacing with various types of digital sensor like IR, proximity sensors, ultrasonic sensors etc. Interfacing with operational amplifier, interfacing with various types of keyboards, interfacing with various types of output devices like Seven Segment Displays, LEDs, LCDs, Graphic LCDs etc

UNIT 6: Design of an embedded system**05**

Case studies related to the design of an embedded systems for various engineering applications

Self-Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will consist of minimum 10 experiments based on the above syllabus.

References:

1. Andrew Sloss, ARM System Developer's Guide, Morgan Kaufman Publication.
2. Tervor Martin, The Insider's Guide to the Philips ARM7 Based Microcontrollers, Hitex Publication
3. Steve Furber, ARM System on Chip Architecture, Addison-Wesley Professional Publication.
4. Dr. Mark Fish, ARM® Cortex® M4 Cookbook, Packt publication.
5. J.W. Valvano, Embedded Systems: Real-Time Interfacing to ARM® Cortex-M Microcontrollers, University of Texas.

L= Lecture, T= Tutorial, P= Practical, C = Credit