

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR1C2: Embedded System using ARM Microcontroller	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller-based embedded systems. High-level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects.

Prerequisite: Knowledge of Microprocessor and C++ Programming

COURSE CONTENTS

Unit I

Introduction: Definition of embedded system, embedded systems vs general computing systems, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, core of the embedded system: general purpose and domain specific processors, embedded system architecture: RISC and CISC, RISC: Introduction of ARM processors, evolution of ARM, ARM design philosophy, ARM processor fundamentals: data flow model, registers, program status register, pipeline, interrupts and vector table, ARM processor families and nomenclature.

Unit II

ARM Basic Instruction Set: Introduction to 32 bit programming, instruction set, architecture of ARM, addressing modes, data processing instructions, branch instructions, load and store instructions, conditional instructions, PSR instructions, stack instructions.

Unit III

ARM Thumb Instruction Set: Overview, branch instructions, data processing instructions, status register access instructions, single register load and store instructions, multiple register load and store instructions, semaphore instructions, coprocessor instructions, stack instructions, interrupt instructions.

UNIT IV

ARM Programming: Assembly language programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, register allocation, conditional execution and loops. C programming for ARM: Simple C program using function, pointers, structures, etc, exception handling, interrupts, interrupt handling schemes.

Unit V

Interfacing and Applications: Programs for LCD display, PWM, ADC, DAC application, measurement and control of physical parameter as temperature, stepper motor control, DC motor control etc.

Text and Reference Books:

- [1] Andrew N. Sloss , “ARM System Developer’s Guide Designing and Optimizing System Software”, Elsevier publication, 2004.
- [2] Par Furber, “Arm System-On-Chip Architecture”, 2/E , Pearson Education Limited, 2000.
- [3] Par Santanu Chattopadhyay, “EMBEDDED SYSTEM DESIGN”, PHI Learning Private Ltd., 2013.
- [4] Jonathan W. Valvano, “Embedded Microcomputer Systems, Real Time Interfacing, Brookes /Cole, 1999, Thomas Learning.