

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name		Instructions Hours per Week		Credits				
DCP1C2 Embedded System using ARM Microcontroller		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

**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.

#### Books Recommended:

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