I Year I Semester	**L**	**P**	**C**
Code: 17PE203	**4**	**0**	**3**

DIGITAL CONTROLLERS
(Common to PE, P&ID, PE&ED, PE&D, PE&S, EM&D, PE&PS)

Prerequisites: Basic concepts of switching theory & logic design and fundamentals of micro controllers.

Course Educational Objectives:

1. To understand the architecture of PIC micro controller.
2. To understand the architecture of DSP processor and their interface.
3. To understand how to write the program for DSP processor using assembly Programming.
4. To understand the different types of FPGA and configurations.
5. To understand the basics of programming in Xilinx.

UNIT- I
PIC MICROCONTROLLERS
PIC Microcontrollers: Overview and Features, PIC 16C6X/7X, FSR(File Selection Register)[Indirect Data Memory Address Pointer], PIC Reset Actions, PIC Oscillator Connections, PIC Memory Organizations, PIC PIC 16C6X/7X Instructions, Addressing Modes, I/O Ports, Interrupts in PIC 16C61/71, PIC 16C61/71 Timers, PIC 16C71 Analog-to-Digital Converter (ADC)

UNIT - II
INTRODUCTION TO DSP
Introduction to the C2xx DSP core and code generation, The components of the C2xx DSP core, Mapping external devices to the C2xx core , peripherals and Peripheral Interface , System configuration registers , Memory , Types of Physical Memory , memory Addressing Modes ,Assembly Programming using C2xx DSP, Instruction Set, Software Tools.

UNIT - III
I/O & CONTROL REGISTERS
Pin Multiplexing (MUX) and General Purpose I/O Overview, Multiplexing and General Purpose I/O Control Registers .Introduction to Interrupts, Interrupt Hierarchy, Interrupt Control Registers, Initializing and Servicing Interrupts in Software.

UNIT - IV
ADC & EVENT MANAGER
ADC Overview , Operation of the ADC in the DSP , Overview of the Event manager (EV) ,Event Manager Interrupts , General Purpose (GP) Timers , Compare UNITs, Capture UNITs And Quadrature Enclosed Pulse (QEP) Circuitry , General Event Manager Information

UNIT - V

FPGA

Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA , Xilinx XC3000 series , Configurable logic Blocks (CLB), Input/Output Block (IOB) – ProgrammableInterconnect Point (PIP) – Xilinx 4000 series – HDL programming – overview of Spartan 3E and Virtex II pro FPGA boards- case study.

Course Outcomes:

After completion of this course the students will be able to:

- Know the interfacing circuits for input and output to PIC micro controllers and DSPprocessors.
- Know how to write ALP for DSP processors.
- Design PWM controls for power electronic circuits using FPGA.

Reference Books:

1. Microcontrollers-Theory and Applications by Ajay V Deshmukh, McGraw Hills
2. Microcontrollers by Kennith J ayala, Thomson publishers
3. Microprocessor and Microcontrollers by Prof C.R.Sarma.
4. Hamid.A.Toliyat and Steven G.Campbell"DSP Based Electro Mechanical Motion Control "CRC Press New York, 2004.
5. XC 3000 series datasheets (version 3.1). Xilinx,Inc.,USA, 1998.
6. Wayne Wolf," FPGA based system design ", Prentice hall, 2004