

# Course Title: Microcontroller based system design

Course Code: DIC E01P

L-T-P: 0-0-6

Total Credits: 3

**Objectives of the course:** This course is intended to give the ambitious students, from the school of technology, a platform to build and materialize their original ideas into a realizable product. The course would be purely practical or project based in which the emphasis would be given on application of micro-controllers, FPGA, etc. in designing an embedded system based product. The course demands development of an end product which can be taken to market.

**Outcomes of the course:** The course would enable students to enrich their knowledge with hands on experiments and project based learning. Selected students from the course will be sponsored by DIC for competing their major project (BTP) in the eight semester. The sponsorship would include the hardware and software cost along with travel grants if the need arises. A student having completed the course and with the experience of working at the DIC in 8<sup>th</sup> semester may be hired as a DIC fellow after successful performance in the program.

**Course Contents:** Overview of embedded system based design, Architecture, Basic assembly language programming (ALP) concepts, Micro-controller programming with C.

Interfacing of 8051/31 microcontroller with external memory, Interfacing of A/D, and D/A converters with 8051 microcontrollers, Interfacing of stepper motor with 8051 microcontrollers, port expansion of 8051, interfacing of different devices through 8155 and 8255 with 8051, interrupt control interfacing.

Introduction to various types of embedded systems, viz. micro-controllers (Arduino, ATMEL, ATMEGA, PIC, etc.), Raspberry PI (Microcomputers), etc. Basics of Interfacing PC with various devices using USB, UART, PARALLEL PORT, etc., Interrupts, Clocks, Counters, Filter design, etc.

Design and implementation of different home automated small projects on printed circuit boards (PCB).

Basics of VHDL programming, Hands on practice of developing controllers using FPGA (Xilinx, Altera).

## Recommended books:

1. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004.
2. Ayala Kenneth, "The 8051 Microcontroller, 3/e", Cengage, 2007.

**Pre-requisites:** Microprocessors, C programming

**Preferred semester:** Seventh (B.Tech) or Fifth (MCA)

**Admission:** Based on screening test

**Faculty in Charge:** Dr. Faroze Ahmad, Dr. Majid Hameed Koul, Mr. Kaiser Giri

**Venue:** Design Innovation Lab at DIC-IUST (New Building – 2, third floor)