MICROCONTROLLERS AND APPLICATIONS
(ELECTIVE-I)

Course Code: 13EC1124

Prerequisites:
Requires pre-knowledge of switching theory and logic design, microprocessors and interfacing

Course Educational Objectives:
✤ To describe the instruction set of 8051
✤ To present interrupt structures in microprocessors and MCUs
✤ To explain the interfacing of peripherals with the MCUs
✤ To discuss advanced microcontrollers like 80196, ARM MCU

Course Outcomes:
Student will be able to
✤ Identify the differences between microprocessor and micro controller instruction set.
✤ Understand how real time control is achieved using interrupts, timers
✤ Interpret the applications of microcontroller which includes interfacing to high power devices, ADCs, DACs etc.,
✤ Understand the various microcontroller architectures ie.,8-bit, 16-bit, 32-bit architectures

UNIT-I

8051 FAMILY MICROCONTROLLERS INSTRUCTION SET:
Architecture of 8051 microcontroller-internal and external memories, Basic assembly language programming – Data transfer instructions – Data and Bit manipulation instructions – Arithmetic instructions – Instructions for Logical operations on the Bytes among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow
UNIT-II (12 Lectures)

REAL TIME CONTROL: INTERRUPTS:
Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or Disabling of the sources – Polling to determine the Interrupt source and assignment of the priorities among them – Interrupt structure in Intel 8051.

REAL TIME CONTROL: TIMERS:
Programmable Timers in the MCUs – Free running counter and real time control – Interrupt interval and density constraints.

UNIT-III (12 Lectures)

SYSTEMS DESIGN:

UNIT-IV (10 Lectures)

REAL TIME OPERATING SYSTEM FOR MICRO CONTROLLERS:
Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design – Software development tools for Microcontrollers.

Microcontroller Based Industrial Applications
Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments

UNIT-V (12 Lectures)

16/32 - BIT MICROCONTROLLERS:
8096/80196 Family: Hardware – Memory map in Intel 80196 family MCU system – I/O ports – Programmable Timers and High-speed outputs and input captures – Interrupts

ARM 32 Bit MCUs: Introduction to 16/32 Bit processors – ARM
architecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set

TEXT BOOKS:

REFERENCES: