Nirma University
School of Technology, Institute of Technology
B. Tech (Instrumentation and Control Engineering)

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Course Code	**2ICDE53**
Course Title	**Advanced Microcontroller and Its applications**

Course Learning Outcome:

At the end of the course, students will be able to –

- Illustrate the architecture of PIC microcontroller
- program microcontroller using various techniques
- design and develop Raspberry Pi based embedded applications

Syllabus	**Teaching Hours**
UNIT 1: PIC Architecture: Overview of PIC series microcontrollers, block diagram, file register set, memory segmentation, hardware input/output ports, memory addresses, support devices	**03**
UNIT 2: Instruction Set and C Language Programming of PIC Series Microcontroller: Instruction formats, addressing modes, instruction set, C directives, PIC series microcontroller programming structures, simple programs involving logical, Branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations, software design using various compilers.	**06**
UNIT 3: PIC Hardware Features: Overview of PIC series microcontroller parallel ports, PIC series timer and counter with programming, PIC series interrupts, CCP modules, ICSP based programming	**03**
UNIT 4: Communication Interface: Serial communication standards, serial programming using USART, SPI bus and I^2C protocols.	**06**
UNIT 5: Getting started with Raspberry Pi: Features of Raspberry pi processor, Operating system set up, Controlling the pi remotely, executing python program with IDLE, use of pi store and libraries, programming on the pi.	**04**
UNIT 6: Embedded application of raspberry pi: Introduction to hardware set up, understanding GPIO port, use of digital	**08**

input/output, analog sensor interface using ADC, connection and working of various sensors, controlling of various motors, serial communication interface, controlling GPIO output using web interface, building embedded applications and case studies.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:
Laboratory work will consist of minimum 10 experiments based on the above syllabus.

References:

1. Han Way Huang, PIC Microcontroller : An Introduction to Software and Hardware Interfacing, Cengage Learning Publication.
2. M.A.Mazidi, PIC Microcontroller & Embedded Systems: Using Assembly and C for PIC18, Pearson Education Publication.
3. Martin P Bates, Programming 8-bit PIC Microcontrollers in C With Interactive Hardware Simulation, Newnes Publication.
4. Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications In Embedded Systems, Penram International Publishing.
5. User Manual of PIC18F/16FXX series controller
6. Simon Monk, Raspberry pi cookbook: O'Reilly publisher.