

The PIC Architecture, Interfacing & Programming

Semester: IV	Subject Code: BS41605	Lectures: 60
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Objectives:

The syllabus aims in equipping the students,

- To study the basics of PIC microcontroller
- To study the Programming and interfacing techniques of PIC
- To apply knowledge of PIC to design different application circuits
- To introduce the basic concepts of Arduino, Raspberry Pi

Unit 1: Basics of Microcontroller & PIC architecture	12
<ul style="list-style-type: none"> • Introduction to microcontrollers, difference in microcontroller and microprocessor. • Architecture of PIC(#7), PIC features, Comparison of some members of the PIC 18 Family. • WREG register(#18), PIC file register, SFRs, GPR, GP RAM vs EEPROM. • File register and access bank in the PIC18(#21-25), PIC status register(#35-36). • Pin diagram (18F458) (#278-281), Configuration register and LIST directive (#282-292). 	
Unit 2: Programming model of PIC	12
<ul style="list-style-type: none"> • Addressing modes, stack and stack pointer in PIC18 (#88-90), Instruction set (#660-697). • ROM width in the PIC18 (#55-56), PIC18 time delay and delay calculations, pipelining, instruction cycle time, branch penalty, loop inside a loop delay (#95-102). • I/O ports programming, I/O bit manipulation programming, program for square wave generation at port pin and port, reading and monitoring single bit, reading input pin vs. LATx port (#109-129). • Bank switching (#197-203). • Introduction to 'C' programming. 	



Unit 3: Timer / counter, serial communication, Interrupts	12
<ul style="list-style-type: none"> • Programming timers 0 and 1: T0CON, INTCON, T1CON, PIR1 register. • Steps to programming timer 0 in 16 bit mode and 8-bit mode, delay calculation (Timer count calculation), T2CON, T3CON register (#314-359) • Counter programming • PIC18 serial communication: serial port programming, SPBRG, TXREG, RCREG, TXSTA, RCSTA register, programming PIC18 to transfer and receive data serially, importance of TXIF and RCIF flag, quadrupling baud rate. (#375-387) • PIC18 Interrupts: Interrupt vector table in PIC18, sources of interrupts, interrupts enabling, external hardware interrupts, port B change interrupts, setting interrupt priority (#402-406,417-422,427-428,432-434). 	
Unit 4: ADC, DAC and peripheral interfacing	12
<ul style="list-style-type: none"> • ADC programming in the PIC18: ADC features programming, ADCON0 , ADCON1 register, conversion time, steps for programming the ADC (#483-492) • Interfacing DAC (#494-498), • Interfacing LCD (#452-462), • Interfacing stepper motor (#620-628) • Introduction to Arduino, Raspberry Pi. 	

*Contact hours – 12 hours

Reference Books:

1. Muhammad Ali Mazadi et al. "**PIC microcontroller and Embedded Systems using assembly and C for PIC 18**", Pearson Education publication, 1st Edition, Fourth Impression 2011(Indian Edition).
2. Peatman, John B, **Design with PIC microcontrollers**, Simon & Schuster Trade, 1997.
3. R.Barnett, L O'Cull and S.Fox,Thomsun, **Embedded C Programming and the Microchip PIC**: (2004)

Reference Links:

- PIC micro 18C MCU reference manual, ww1.microchip.com/downloads/en/DeviceDoc/39500a.pdf
- PIC18FXX8 data sheet , ww1.microchip.com/downloads/en/devicedoc/41159d.pdf

