EC-310 Microprocessor and Microcontroller Based Design

Course Introduction

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Outline

1. Course Information
2. Course Assessment
3. Course related books and related material
4. Course topics
5. Course outcomes and their relation to Program Learning Outcomes (PLOs)

1. Course Information

Course Number and Title:	EC-310: Microprocessor and Microcontroller Based Design
Credits:	4 (3+1)
Instructor(s)-in-charge:	Dr. Nazar Abbas Saqib
Course type:	Lecture + Lab
Required or Elective:	Required
Course pre-requisites	EC 210-Logic and Sequential Circuit Design
Degree and Semester	DCE-36, Semester 5
Month and Year	Fall 2016

1. Course Information
Topics covered in the Course and Level of Coverage

Introduction to course & Historical background of Microprocessors and Microcontrollers • Introduction to course – course outline, education needs • Evaluation of IC technology	1 HR
Introduction to computing • Basic concepts in digital logic design: A review • Number and coding system • Computer architecture – a short brief	2 HRS
The PIC Microcontrollers • Microprocessor and Embedded System • Overview of the PIC Microcontrollers • Choosing a Microcontroller – Criteria	3 HRS
The PIC18 Assembly Language Programming • Architecture & Organization of Microchip PIC Microcontrollers • Introduction to PIC18 Assembly Programming • Assembling, Linking and Running a PIC18 Program • PIC18 Data Types and Directives	9 HRS
I/O Port Programming • PIC18 Programming • I/O Bit manipulation programming • Bit addresses for I/O and RAM • Extra 128-byte on-chip RAM in PIC18	3 HRS

1. Course Information

Topics covered in the Course and Level of Coverage

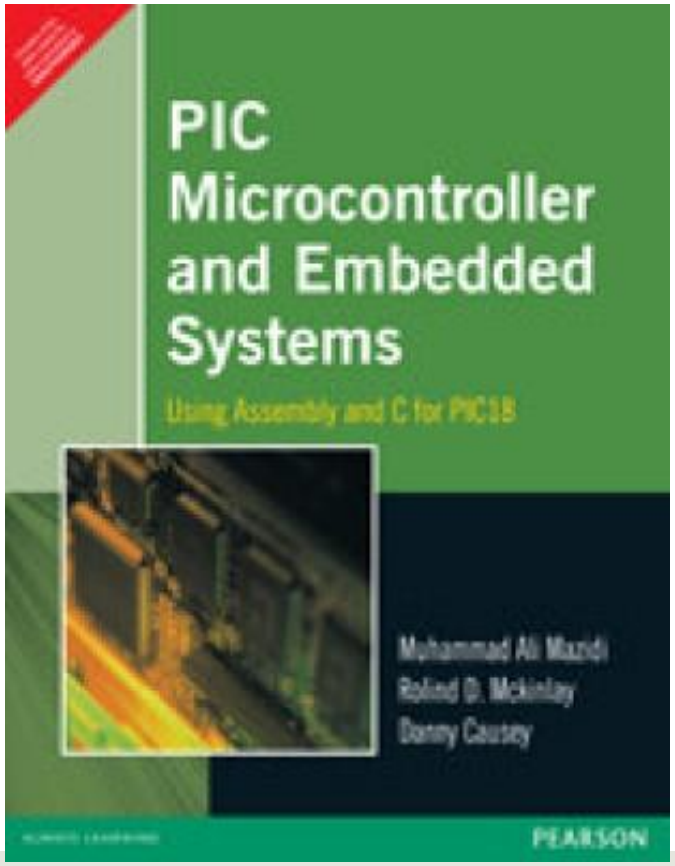
Arithmetic, Logic Instructions and Programs a. Arithmetic Instructions b. Signed number concepts and arithmetic operations	3 Hrs
PIC18 Programming in C a. Data types and time delay in PIC18 C b. I/O Programming in PIC18 C c. Logic Operations in PIC18 C	6 Hrs
PIC18 Hardware Connection and Intel Hex File a. Pin description of the PIC18 b. Explaining the Intel hex File	3 Hrs
Serial Port Programming in Assembly and C a. Basics of serial communication b. PIC18 serial port programming in assembly	3Hrs
Review a. Review of important concepts before OHT-1 b. Review of important concepts before OHT-2 c. Review of important concepts after OHT-2 d. Addressing student's queries	2 Hrs

2. Course Assessment

Exam:	2 Sessional and 1 Final	
Home work:	2 Assignments	
Lab reports:	12 reports	
Design reports:	1 Design report based on Semester Project	
Quizzes:	5 Quizzes	
Grading:	**Quizzes:**	5%
	Assignments:	5-10%
	2 One Hour Tests (OHTs):	25-30%
	Final Exam:	40-50%
	Lab:	25%
	Semester Project:	10%

3. Course book and Related Course Material

Textbooks:	1. Muhammad Ali Mazidi , Rollind D. Mckinlay and Danny Causey, PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18, 15th edition, 2013
Reference Books:	1. PIC Microcontroller: An Introduction to Software and Hardware Interfacing By Han-Way Huang, 2005 2. Interfacing PIC Microcontrollers: Embedded Design by Interactive Simulation By Martin P. Bates, 2nd Edition, 2013



4. Course Objectives

a) The students will have basic understanding of the architecture and operation of modern microprocessor based computer systems.

b) The students will acquire in-depth knowledge of Microchip PIC microcontrollers.

c) The students will gain expertise in writing programs in assembly language using instruction set of PIC18 Microcontroller.

d) The students will gain knowledge regarding hardware aspects of PIC microcontrollers, e.g. interfacing of PIC microcontroller with memory and input/output devices, understanding timing diagram of memory/input-output read/write bus cycles etc.

e) Thus having acquired knowledge in both software and hardware areas of intel based components the student will be able to take on projects using intel components and developing software programs in assembly language to meet their specific requirement.

f) The students will acquire knowledge of Microchip PIC microcontrollers and its use in embedded systems

5. Course Outcomes and their Relation to Program Outcomes (Mapping CLO to PLO)

Course Learning Outcome (CLOs)		PLOs	Learning Level
CLO 1	Explaining the basic and fundamental concepts about the architectures of microprocessors and microcontrollers including CPU, memory, I/O devices	PLO 1	C2
CLO 2	Reviewing the instruction set of PIC18 in both assembly and C languages	PLO 1	C2
CLO 3	Using arithmetic operations, logical operations, loops, jumps in C & assembly language to program PIC18	PLO 1	C3
CLO 4	Implementing serial and parallel interfaces and interfacing of peripheral devices like external memory, key boards and LCDs by using instruction set of PIC18	PLO 3	C3
CLO 5	Developing an embedded system by using PIC18 to provide user-based solutions	PLO 3	P4

1. Program Learning Outcomes	
PLO 1	Engineering Knowledge
	An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PLO 2	Problem Analysis
	An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PLO 3	Design/Development of Solutions
	An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PLO 4	Investigation
	An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.
PLO 5	Modern Tool Usage
	An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.
PLO 6	The Engineer and Society
	An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.
PLO 7	Environment and Sustainability
	An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PLO 8	Professional Ethics
	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO 9	Individual and Teamwork
	An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
PLO 10	Communication
	An ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PLO 11	Project Management
	An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.
PLO 12	Lifelong Learning

Any Question?