

<b>MICROPROCESSORS AND MICROCONTROLLERS</b> [As per Choice Based Credit System (CBCS) scheme] (Effective from the academic year 2016 -2017) <b>SEMESTER – IV</b>			
Subject Code	15CS44	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03
<b>CREDITS – 04</b>			
<b>Course objectives:</b> This course will enable students to <ul style="list-style-type: none"> <li>• Make familiar with importance and applications of microprocessors and microcontrollers</li> <li>• Expose architecture of 8086 microprocessor and ARM processor</li> <li>• Familiarize instruction set of ARM processor</li> </ul>			
<b>Module 1</b>			<b>Teaching Hours</b>
<b>The x86 microprocessor:</b> Brief history of the x86 family, Inside the 8088/86, Introduction to assembly programming, Introduction to Program Segments, The Stack, Flag register, x86 Addressing Modes. <b>Assembly language programming:</b> Directives & a Sample Program, Assemble, Link & Run a program, More Sample programs, Control Transfer Instructions, Data Types and Data Definition, Full Segment Definition, Flowcharts and Pseudo code. <b>Text book 1: Ch 1: 1.1 to 1.7, Ch 2: 2.1 to 2.7</b>			<b>10 Hours</b>
<b>Module 2</b>			
<b>x86:</b> Instructions sets description, <b>Arithmetic and logic instructions and programs:</b> Unsigned Addition and Subtraction, Unsigned Multiplication and Division, Logic Instructions, BCD and ASCII conversion, Rotate Instructions. <b>INT 21H and INT 10H Programming :</b> Bios INT 10H Programming , DOS Interrupt 21H. 8088/86 Interrupts, x86 PC and Interrupt Assignment. <b>Text book 1: Ch 3: 3.1 to 3.5, Ch 4: 4.1 , 4.2 Chapter 14: 14.1 and 14.2</b>			<b>10 Hours</b>
<b>Module 3</b>			
<b>Signed Numbers and Strings:</b> Signed number Arithmetic Operations, String operations. <b>Memory and Memory interfacing:</b> Memory address decoding, data integrity in RAM and ROM, 16-bit memory interfacing. <b>8255 I/O programming:</b> I/O addresses MAP of x86 PC's, programming and interfacing the 8255. <b>Text book 1: Ch 6: 6.1, 6.2. Ch 10: 10.2, 10.4, 10.5. Ch 11: 11.1 to 11.4</b>			<b>10 Hours</b>
<b>Module 4</b>			
Microprocessors versus Microcontrollers, <b>ARM Embedded Systems :</b> The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, <b>ARM Processor Fundamentals :</b> Registers , Current Program Status Register , Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions <b>Text book 2:Ch 1:1.1 to 1.4, Ch 2:2.1 to 2.5</b>			<b>10 Hours</b>
<b>Module 5</b>			
<b>Introduction to the ARM Instruction Set :</b> Data Processing Instructions , Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants, Simple programming exercises. <b>Text book 2: Ch 3:3.1 to 3.6 ( Excluding 3.5.2)</b>			<b>10 Hours</b>
<b>Course Outcomes:</b> After studying this course, students will be able to			

<ul style="list-style-type: none"> <li>• Differentiate between microprocessors and microcontrollers</li> <li>• Design and develop assembly language code to solve problems</li> <li>• Gain the knowledge for interfacing various devices to x86 family and ARM processor</li> <li>• Demonstrate design of interrupt routines for interfacing devices</li> </ul>
<b>Graduate Attributes</b>
<ul style="list-style-type: none"> <li>• Engineering Knowledge</li> <li>• Problem Analysis</li> <li>• Design/Development of Solutions</li> </ul>
<b>Question paper pattern:</b>
<p>The question paper will have ten questions.  There will be 2 questions from each module.  Each question will have questions covering all the topics under a module.  The students will have to answer 5 full questions, selecting one full question from each module.</p>
<b>Text Books:</b>
<ol style="list-style-type: none"> <li>1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Danny Causey, The x86 PC Assembly Language Design and Interfacing, 5<sup>th</sup> Edition, Pearson, 2013.</li> <li>2. <b>ARM system developers guide</b>, Andrew N Sloss, Dominic Symes and Chris Wright, Elsevier, Morgan Kaufman publishers, 2008.</li> </ol>
<b>Reference Books:</b>
<ol style="list-style-type: none"> <li>1. Douglas V. Hall: Microprocessors and Interfacing, Revised 2<sup>nd</sup> Edition, TMH, 2006.</li> <li>2. K. Udaya Kumar &amp; B.S. Umashankar : Advanced Microprocessors &amp; IBM-PC Assembly Language Programming, TMH 2003.</li> <li>3. Ayala : The 8086 Microprocessor: programming and interfacing - 1st edition, Cengage Learning</li> <li>4. The Definitive Guide to the ARM Cortex-M3, by Joseph Yiu, 2nd Edition , Newnes, 2009</li> <li>5. The Insider's Guide to the ARM7 based microcontrollers, Hitex Ltd., 1<sup>st</sup> edition, 2005</li> <li>6. ARM System-on-Chip Architecture, Steve Furber, Second Edition, Pearson, 2015</li> <li>7. Architecture, Programming and Interfacing of Low power Processors- ARM7, Cortex-M and MSP430, Lyla B Das Cengage Learning, 1<sup>st</sup> Edition</li> </ol>