GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS (10)
SUBJECT NAME: ADVANCED MICROPROCESSOR
SUBJECT CODE: 2181006
B.E. 8th SEMESTER

Type of course: NA

Prerequisite: Microprocessor, Microcontroller

Rationale: The course is aim to

1. To understand 8086 family of microprocessor
2. Programming of 8086 family
3. Learn 8086 to Pentium, multiple core microprocessor, ARM processor

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Microprocessor and Its Architecture: Internal 8086/8088 microprocessor architecture, Real mode memory addressing, Addressing modes.	5	10
2	Programming The Microprocessor: Data movement instructions, Arithmetic and logic instructions, Program control instructions, string instruction, assembly language programming, assembler directives, program development tools.	10	20
3	8086 Hardware specifications: 8086 pin-outs and pin functions, Clock generator, Bus buffering and latching, Bus timings, Ready and wait stat, minimum/maximum mode operation, Memory interfacing with 8086, address decoding, Introduction to basic I/O interface, I/O port address decoding.	10	20
4	Basic interrupt processing: The purpose of interrupts, Interrupts, Interrupt instructions, the operation of a real mode interrupt, Interrupt flag bits, storing an interrupt vector in the vector table. Hardware interrupts: INTR and INTA.	8	15
5	80186, 80188 and 80286 microprocessors: 80186/80188 basic block diagram and basic features, Introduction to 80286 hardware features, additional instructions.	8	15
	The 80386 and 80486 microprocessor: Introduction to 80386 microprocessor, Special 80386 registers, Memory Management, Moving to protected mode, Virtual 8086 mode, Memory paging mechanism, 80486 microprocessor architecture and memory		

	system.		
6	Pentium, Pentium Pro, Pentium II, Pentium III, Pentium IV and Core2 microprocessors: Introduction to Pentium microprocessor, Special Pentium registers, Basic and additional features of Pentium Pro, Pentium II, Pentium III, Pentium IV and Core2 microprocessors.	8	15
7	Introduction to ARM architecture, Instruction set and programming	3	5
	Total	52	100

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**15**	**20**	**10**	**10**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit Extensions, 8th Edition , Barry B. Brey , Pearson Education
2. Microprocessors and Interfacing By Douglas V Hall Revised Second Edition, McGraw Hill Publication
3. The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware and Applications, Fourth Edition, By Walter A Triebel and Avtar Singh, Pearson Education.
4. ARM Assembly Language Programming & Architecture By. Muhammad Ali Mazidi, Kindle edition

Course Outcome:

After learning the course the students should be able to:

[1] Become familiar with importance and applications of advance microprocessor
[2] Understand architecture of 8086 and ARM processor
[3] Understand instruction set and programming of 8086 and ARM processor
[4] Understand interfacing of various peripherals to 8086

List of Experiments:

1. Introduction of 8086 program development tools (Editor, Masm, Link, Debug and its command), directives and instructions and writes steps to assemble, link and execution of program.

2. Write Assembly Language Program for addition, subtraction, multiplication and division of 8 bit signed and unsigned numbers.
3. W.A.L.P. for addition, subtraction, multiplication and division of 16 bit no.
4. W.A.L.P. for addition, subtraction, multiplication and division of 32 bit no.
5. W.A.L.P. for ASCII/ BCD arithmetic and conversion of numbers.
6. W.A.L.P. to find valid 2 out of 5 code of a given number.
7. W.A.L.P. for to do logical operations like AND, TEST, OR, XOR, NOT etc..
8. W.A.L.P. to add two multi byte numbers and store result.
9. W.A.L.P. to add series of 8/16 bit numbers considering possible overflow.
10. W.A.L.P. to copy/exchange block of data (Array of 8 bit, 16 bit) from one location to another with and without overlap.
11. W.A.L.P. for addition, subtraction, multiplication and division of two array (8 bit, 16 bit) and store result in third array.
12. W.A.L.P. to find Max. /Min. from given 8/16 bit given array.
13. W.A.L.P. to find even and odd number from given 8 bit array.
14. W.A.L.P. to arrange given array in ascending and descending order.
15. W.A.L.P. to find given array/ byte is palindrome or not.
16. W.A.L.P to count number of 1's and 0's in a given data byte
17. W.A.L.P. (i) copy string to another location/compare two strings (ii) Reverse string (iii) check palindrome or not (iv) searching a word from given string (vi) Find a character and replace with another character from given string.
18. W.A.L.P. to convert BCD to binary and vice versa of given 8 bit number.
19. W.A.L.P. to find HCF/LCM of two 8 bit numbers.
20. W.A.L.P. to generate Fibonacci series of 8 bit numbers.
21. W.A.L.P. to generate prime numbers of 8 bit numbers.
22. W.A.L.P. to add two square matrices of 8 bit numbers.
23. W.A.L.P. to compute factorial of given number using near procedure and far procedure.
24. W.A.L.P. to copy string to another location using MACRO.
25. W.A.L.P. to calculate formula X*Y+Y*(Y-Z) for 8 bit numbers.
26. W.A.L.P. using DOS and BIOS Function calls.
27. To write and simulate ARM assembly language programs for data transfer, arithmetic and logical operations
28. To write and simulate C Programs for ARM microprocessor in KEIL

Design based Problems (DP)/Open Ended Problem:
Student's mini project using ARM processor

Major Equipment:

Freescale freedom development boards for ARM

List of Open Source Software/learning website:

MASM/TASM, KEIL IDE and Proteus for simulation

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.