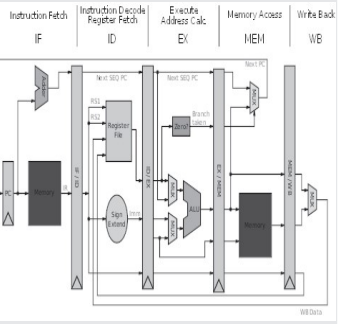

Source:
https://naoreenchowdhury.files.Wordpress.com/

19CS214 COMPUTER ORGANIZATION AND ARCHITECTURE

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

CS	WA/RA	SSH	SA	S	BS
5	5	30	20	5	5

PREREQUISITE FOR THIS COURSE: Digital Logic Design.

COURSE DESCRIPTION AND OBJECTIVES:

This course covers the basics of modern Computer Organization and Architecture. The emphasis is on understanding the design of computer and its components. The student will learn the concepts of data representation, micro operations, memory organizations and input output organization. Case study of 8086 helps the students to visualise the basic concepts of the course.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Distinguish computer organization and computer architecture; structure and function of computer components; Understand the instruction execution cycle, Understand 8086 architecture.	2
2	Design and develop different digital circuits required to perform the micro operations.	3
3	Design interface circuits for memory and peripheral, DMA and communication devices. Compare various modes of data transfer.	3
4	Develop solutions using assembly level language.	3,4
5	Evaluate the performance of processor and memory in terms of speed, size and cost.	2

SKILLS:

- ✓ *Learn different data representations.*
- ✓ *Design digital circuitry for implementing different operations.*
- ✓ *Identify the types of memories and their uses.*
- ✓ *Study various data transfer mechanisms in digital computer and I/O.*

UNIT– I **L- 9**

INTRODUCTION, RTL & DATA REPRESENTATIONS: Introduction- organization and architecture, structure and function; RTL - Register transfer language, register transfer, bus and memory transfers; Data representations - fixed point representation and floating point representation; Overflow.

UNIT – II **L- 9**

MICRO OPERATIONS: Arithmetic micro operations; Logic micro operations; Shift micro operations; Arithmetic logic shift unit.

CASE STUDY: Register organization of 8086; Architecture of 8086.

UNIT – III **L-9**

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes; Computer registers; Computer instructions; Instruction cycle; Memory reference instructions; Register reference instructions, Input-output; Interrupt.

CASE STUDY: Addressing modes of 8086, Instruction set of 8086.

UNIT – IV **L- 9**

MEMORY ORGANIZATION: Memory hierarchy; Main memory; Associative memory; Cache memory; Virtual memory.

CASE STUDY: Interfacing semiconductor memory with 8086

UNIT - V **L- 9**

INPUT- OUTPUT ORGANIZATION: Peripheral devices; Input-output interface; Asynchronous data transfer; Modes of transfer; Priority interrupt; Direct memory access.

CASE STUDY: Interfaces- (8251) USART, (8257) DMA Controller, (8255) programmable peripheral interface.

TEXT BOOKS:

1. M.Moris Mano, “Computer Systems Architecture”, 3rd edition, Pearson/Prentice Hall India, 2007.
2. William Stallings, “Computer Organization and Architecture”, 6th edition, Pearson/Prentice Hall India, 2007
3. A. K.Ray and K. M. Burchandi, “Advanced micro processor and peripherals-TMH”, 3rd edition, 2000.

REFERENCE BOOKS:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th edition, Tata McGraw Hill, 2007.
2. Vincent P. Heuring and Harry F Jordan, “Computer Systems Design and Architecture”, 2nd edition, Pearson/Prentice Hall India, 2004.
3. David A Patterso and John L Hennessy, “Computer Organization and Design - The Hardware/ Software Interface, ARM edition”, 5th edition, Elsevier, 2009.

ASSIGNMENTS:

UNIT - I

1. Perform addition and subtraction of +150 and -150 and find whether overflow occurs or not and write a way to identify the occurrence of overflow.
2. Explain the register transfer language in detail.
3. Construct an 8-bit common bus using multiplexers.
4. Design a 4-bit Decrementer circuit using full adder.

UNIT - II

1. Explain the functionality of arithmetic logic shift unit for a basic organization.
2. An 8-bit register R contains a binary value 10111011. Represent the value of R after two circular shift operations.
3. Explain different micro operations in detail.
4. Explain the architecture of 8086 microprocessor.

UNIT - III

1. Demonstrate instruction execution cycle and represent specifically what happens at clock cycle T_3 in each type instruction.
2. Explain different addressing modes of 8086.
3. Explain the interrupt cycle.
4. Understanding the instruction set of 8086.

UNIT - IV

1. Discuss in detail the cache mapping techniques.
2. How many 128x8 RAM chips are required to provide a memory with a capacity of 2048 bytes.
3. List and explain the cache writing policies.
4. Take a numerical example and explain address mapping using pages in virtual memory.
5. Understand how memory interfaced in 8086.

UNIT - V

1. Understand working of 8257 DMA controller.
2. Understanding 8255- programmable peripheral interface.