AMITY UNIVERSITY
UTTAR PRADESH

Course Title: Computer Architecture and assembly language
Course Level: UG
Course Code: CSIT115
Credit Units: 3

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
2	-	2	-	3

Course Objectives:

The objective of this course is to develop:

- An understanding of the underlying operation of a modern digital computer
- Identify and understand the various "building blocks" from which a modern computer is constructed.
- Assembly languages programs and understand the underlying operations of more complex programs using Intel's 8085 Microprocessor.

Pre-requisites:
Computer Fundamentals and Programming Concepts
Digital Electronics

Course Contents/Syllabus:

	Weightage (%)
Module I: General Computer Architecture	**10**
Block Diagram of typical Computer, Memory Section, Input/Output Section, CPU, Registers, Arithmetic Unit, Micro operations: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit,	
Module II: Basic Computer Organization and Design	**15**
Instruction Codes, Operation code, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts	
Module III Central Processing Unit	**15**

General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC.Control Memory: Control Word, Microinstruction, Microprogramming	
Module IV Pipelining and Vector Processing	**15**
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors	
Module V Input Output Organization	**20**
I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication	
Module VI: Memory Organization:	**15**
Memory Hierarchy, Main memory(RAM and ROM chips),Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.	
Module VII: Introduction to Microprocessor	**10**
Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, Pin diagram and Internal Architecture 8085.	

Student Learning Outcomes:
The student will be able:

- To learn how the computer hardware has evolved to meet the needs of multiprocessing systems.
- To explain the major components of a computer including CPU, memory, I/O and storage.
- To demonstrate the uses for cache memory, associative memory and other memory.
- To explore a wide variety of memory technologies both internal and external.
- To analyze the role of the operating system in interfacing with the computer hardware.
- To explain the basic components of the CPU including the ALU and control unit.
- To develop logics using Assembly programming.
- To design principles in instruction set design including RISC architectures.
- To identify the Parallelism both in terms of a single processor and multiple processors.

List of Experments:

1. To develop a program using the ADI instruction to add the two hexadecimal numbers 3AH and 48H and store the result in memory location 2100H.
2. To develop a program to load the two hexadecimal numbers 54H and 48H in registers A and B respectively. Add the numbers, and display the sum at the LED output ports PORT 1.
3. To develop a program to load the two largest 4 digit hexadecimal numbers. Add the numbers, and display the sum. Assume register of your choice
4. To develop a program to load the two hexadecimal numbers 54H and 48H in registers A and B respectively. Subtract the numbers, and display the sum at the LED output ports PORT 2
5. To develop an Assembly Code to perform the swapping of data of two memory locations
6. To develop an Assembly Code to perform Right rotation and left rotation of the Register D.

7. To develop an Assembly Code to multiply two Hexadecimal numbers.
8. Write an Assembly Code to count number of l's in the contents of D register and store the count in the B register.
9. To develop a program in assembly language program to find the square of numbers
10. To assume the register B holds 98H and the accumulator holds 15 H. illustrate the results of the instructions ORA B, XRA B and CMA.
11. To develop an 8085 assembly language program to find the smallest value between two number in memory location 2800H and 2801. Store the value in memory location 3000H
12. To develop an 8085 assembly language program to find the smallest value between two number in memory location 2800H and 2801. Store the value in memory location 3000H

Pedagogy for Course Delivery:

The class will be taught using theory and practical based method. The course instructor will assign case studies to students for better understanding of the concepts learnt during theory class. The student will be able to apply the knowledge of hardware in real time.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
66.6	**33.4**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**Mid-Term Exam**	**Assignment**	**Project**	**Attendance**	**EE**
Weightage (%)	10	5	10	5	70

Practical(P)

	Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**Mid-Term Exam**	**Lab Record**	**Continuous Performance**	**Internal Viva**	**Attendance**	
Weightage (%)	10	10	10	5	5	60

Text & References:

Text:

- Computer System Architecture, M. Morris Mano, 3rd Edition, PHI, 2003
- Computer Organization and Architecture, William Stallings, 7th edition, PHI, 2004
- Microprocessor Architecture Programming and applications with 8085, Ramesh S. Gaonkar, Fourth Edition
- Structured computer Organization, Tanenbaum, PHI, 4th edition, Pearson, 2006

References:

- John L. Hennessy & David A, Patterson, A Quantative Approach, Computer Architecture, Elsevier, 3rd edition