

NIRMA UNIVERSITY

Institute:	Institute of International Study
Name of Programme:	Bachelor of Science (Computer Science and Engineering) [2+2 Dual Degree]
Faculty	Faculty of Technology & Engineering
Course Code:	1XXXX 2CS503
Course Title:	Computer Organization and Assembly Language Programming
Course Type:	Core
Year of Introduction:	2023-24

L	T	Practical Component				C
		LPW	PW	W	S	
2	-	2	-	-	-	3

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. summarize the basics of various architectural units of the Computer System.
2. apply the fundamental knowledge of assembly language programming to implement the functionalities of various architectural units.
3. inspect various architectural units of a basic computer system.
4. propose optimization techniques to minimize the design cost of architectural units.

Syllabus:

Total Lecture hours: 30

Unit	Syllabus	Teaching hours
Unit-I	Introduction to Computer Architecture: Register transfer, Bus and memory transfer, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, and Arithmetic logic shift unit, Computer registers, Computer instructions, Timing and control, Instruction cycle, Memory reference instructions, Input-Output and interrupt	06
Unit-II	Central Processing Unit: Introduction, Instruction formats, Addressing modes, Program control, RISC and CISC, Control Memory, Address sequencing, Microprogram example, Design of Control unit	06
Unit-III	Assembly Language: Introduction, Syntax, Microinstructions, Design of Microprogrammed Control Unit	06
Unit-IV	Optimization: Parallel Processing, Pipelining, Arithmetic pipelining, Instruction pipelining, RISC pipeline, vector processing, Array processors	04
Unit-V	Input Output Organization: Input output interface, Asynchronous data transfer, Modes of transfer, Priority interrupt, Direct Memory access (DMA), Input output processor (IOP), CPU-IOP communication, Serial communication	04
Unit-VI	Memory Organization: Memory hierarchy, Main memory, Auxiliary memory, Flash memory, Associative memory, Cache memory, Virtual memory	04

34

34

[Handwritten signature]
a.3

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

Suggested Readings/
References:

1. Computer System Architecture: by M. Morris Mano (Prentice Hall of India)
2. Computer Organization and Architecture by Williams Stallings (Prentice Hall of India)
3. Microprocessors and Interfacing Programming and Hardware by Douglas V Hall (Tata McGraw Hill)
4. Computer Organization by V. Carl Hamacher, Zvonko G. Vranesic and Safwat G. Zaky
5. Computer Installation and Troubleshooting by M.Radhakrishnan, D. Balasubramanian
6. Assembly Language for Intel-Based Computers by Kip Irvine

Suggested List of
Experiments:

Sr. No.	Title	Hours
1	Demonstration of various hardware units of a computer system	02
2	Implement a common bus system for data and address transfer	02
3	Design an ALS Unit for the basic computer system	04
4	Show the simulation of the instruction cycle for a memory reference instruction and an I/O instruction	04
5	Design the control logic for the hardwired control unit	04
6	Show the simulation of control memory for the microprogrammed control unit	04
7	Program the control memory designed in Sr. No. 5 using the assembly language	04
8	Implement an instruction pipeline to optimize the instruction execution cycle	02
9	a) Show the simulation of Associative Memory b) Show the simulation of Cache Memory	02
10	Show the simulation of DMA	02

Suggested Case List:

-NA-

ch
9.3