

16CS205 COMPUTER ORGANIZATION AND ARCHITECTURE

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

CS	WA/RS	SSH	SA	S	BS
7	5	40	8	2	2

Course Description and Objectives:

This course introduces Register Transfer Language, Computer Arithmetic, Basic Computer Organization and Design, Pipeline processing, Memory and Input Output Organizations. Further it helps to understand and analyze the functions and organizations of modern digital computers. It also offers students learning experience in the design and development of solutions and applications for modern digital computer systems using assembly language. The objective of the course is to enable the students to understand the basic structure and operation of a digital computer and also to know in detail the operation of the arithmetic unit, logical unit, control unit, different ways of communicating with I/O devices and the hierarchical memory system.

Course Outcomes:

The student will be able to:

- demonstrate the understanding of the basic principles of organization and operations of digital computers using assembly language.
- evaluate the technical issues of digital computer systems including arithmetic logic unit, control unit, communication with peripheral devices and interrupt handling.
- develop solutions related to the organization of digital computer systems.
- recognize and identify the developmental nature of technology related to modern digital computers.

SKILLS:

- ✓ *Writing assembly language programs that make use of various hardware resources.*
- ✓ *Perform fixed and floating point arithmetic operations.*
- ✓ *Identifying the types of memories and their uses.*
- ✓ *Perform data transfer mechanism in digital computer.*

UNIT - 1**L-9, T-2**

INTRODUCTION &RTL: Organization and architecture, Block diagram of digital computer, Structure and function. Register Transfer language – Register Transfer Bus and memory transfers.

UNIT - 2**L-9, T-4**

COMPUTER ARITHMETIC: Arithmetic micro operations, Logic micro Operations, Shift micro operations and Arithmetic logic shift unit. Addition and subtraction, Multiplication Algorithms and Division Algorithms, Floating point representation and its operations.

UNIT - 3**L-9, T-4**

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer instructions, Instruction cycle, Memory–Reference Instructions, Register Reference instructions, Input-Output and Interrupt, Stack organization, Instruction formats, Addressing modes, Data Transfer and manipulation, Program control, Reduced Instruction set computer.

UNIT - 4**L-9, T-3**

PIPELINE PROCESSING & MEMORY ORGANIZATION: Pipeline processing-Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, RISC pipeline. The memory organization - Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory.

UNIT - 5**L-9, T-2**

INPUT- OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access, Input-Output Processor (IOP), Serial communication.

TEXT BOOKS:

1. M.Moris Mano, "Computer Systems Architecture", 3rd edition, Pearson/Prentice Hall India, 2007.
2. William Stallings, "Computer Organization and Architecture", 7th edition, Pearson/Prentice Hall India , 2007.

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.

ACTIVITIES:

- *development of assembly language programs that leverage the underlying hardware resources efficiently.*