EC-209 **COMPUTER ORGANISATION** **L T P C**
4 - - 3

COURSE OBJECTIVES:

1. To understand the basic organization of modern computer systems
2. To interpret how computer programs are organized, stored, and executed at the machine level.
3. To analyze an instruction-set architecture and propose a suitable data path and control unit implementation.
4. To understand the input/output mechanisms used to connect computers to their external environments.
5. To familiarize the design of high performance processors using single-cycle, multi-cycle and pipelined execution of instructions
6. To learn the concepts of memory hierarchy and do operations with various types of memories.

COURSE OUTCOMES:

After successful completion of the course, the students are

1. understand the computer hardware basics, addressing techniques, instruction sequencing and multiprocessing system.
2. demonstrate pipelining concepts for improving the performance of a computers.
3. implement algorithms for arithmetic operations on signed and unsigned numbers.
4. analyse basics of memories and I/O data transfer techniques.
5. Analyse register-transfer-level treatment for implementation of instruction fetching and execution in a processor.

UNIT I *Text Book - 1* **(10)**

Basic structure of computers : Computer types, Functional units, Basic operational concepts, Bus structures, Performance, multiprocessors and multi computers.

Instructions and Instruction sequencing: Numbers, Arithmetic operations and characters, Memory location and addresses, Memory operations, Instructions and instruction sequencing, addressing modes.

UNIT II *Text Book - 1* **(10)**

Arithmetic : Addition and subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication, Integer division, Floating point numbers and operations.

UNIT III *Text Book - 1* **(15)**

Pipelining : Basic concepts, Data hazards, Instruction hazards, Influence of instruction sets, Data path and control considerations, Super scalar operation, Performance considerations.

Memory system : Basic concepts, Semi conductor RAM memories- Internal Organization of memory chips, Read only memories, Speed, size and cost, Cache memories, Performance considerations, Virtual memories.

UNIT IV *Text Book - 1* **(12)**

Input/Output organization : Accessing I/O devices, Interrupts- Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions,, Direct memory access, Buses Interface circuits, Standard I/O interfaces: PCI bus , SCSI bus, USB.

UNIT V *Text Book - 1,2* **(12)**

Basic processing : Some fundamental concepts, Execution of a complete instruction, multiple bus

organization, Hard wired control, Micro programmed control.

Multiprocessors : Characteristics of Multiprocessors, Interconnection Structures : Time-shared Common bus, Multiport memory, Multistage Switching Network, Hypercube Interconnection, Interprocessor arbitration, Interprocessor Communication and Synchronization, Cache Coherence.

LEARNING RESOURCES:

TEXT BOOK(s):

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky - Computer Organization, 5th Edition, Tata McGraw Hill, 2002.
2. M.Moris Mano - Computer Systems Architecture, Third Edition, Pearson/PHI, 2007

REFERENCE BOOK(s):

William Stallings - Computer Organization & Architecture, 7th Edition, PHI, 2006.

WEB RESOURCES:

1. http://www.staroceans.org/kernel-and-driver/Computeranization%20And%20Embedded%20Systems,%20Hamacher,%20Vranesic,%20Zaky,%20Manjikian,%206Ed,%20Mgh,%202012.pdf
2. https://www.classle.net/large-content/hardwired-control-vs-microprogram
3. http://www.eecg.toronto.edu/~moshovos/ACA05/004-pipelining.pdf
4. http://publib.boulder.ibm.com/infocenter/iseries/v5r3/index.jsp?topic=%2Fapis%2FMIintro.htm