

**EC-209****COMPUTER ORGANISATION**

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**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/iserics/v5r3/index.jsp?topic=%2Fapis%2FMIintro.htm>