EC-220 Computer System Architecture - Course Contents

a. **Credits** : 3+1

b. **Textbooks** : 1) M. Morris Mano , “Computer System Architecture”, Latest

Edition, Prentice Hall,

2) M. Morris Mano “Digital Logic and Computer Design” , Latest

Edition, Prentice Hall.

c. **References:**

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design”, “The Hardware/Software Interface”, **Latest** Edition, Morgan Kaufman Publishers.

d. **Objectives/Goals:**

The objective of the course is to gain basic understanding of computer system architecture which includes computer arithmetic, register transfer language and micro operations, common bus system design, design of arithmetic logic unit, design of hardwired control unit and micro programmed control unit, instruction sets and addressing modes, memory system design, cache memory, virtual memory system, input/output interface and operations and advanced topics such as parallel processing and pipeline processing.

e. **Course Outcomes :** On completion of the course,

i. The students will have basic understanding of computer system architecture and digital computers.

ii. The students will acquire in-depth knowledge of register transfer language, arithmetic, logic and shift micro operations, common bus system design and memory transfers, tri-state buffers.

iii. The students will gain knowledge of arithmetic operations on signed binary numbers. overflow detection circuit design, design of arithmetic logic Unit and control unit, hardwired control unit and micropragrammed control unit.

iv. The students will gain knowledge regarding microprocessor organization, microprocessor sequencing, memory cycles, microprocessor instruction set and addressing modes and types of microprocessor instructions, machine language, introduction to assembly language.

v. The students will acquire in-depth knowledge of stack operations, subroutines, interrupts, priority Interrupt, memory system design, memory hierarchy, primary memory (RAM. ROM), secondary memory, function table of RAM & ROM, memory address map. and interfacing microprocessor with memory.

vi. The students will acquire knowledge of cache memory. different designs of cache memory system, virtual memory system, and address mapping using pages.

vii. The students will be able to understand, input/output interface, memory mapped input/output, isolated input/output. parallel peripheral interface, serial communication interface and direct memory access.

The students will gain broad knowledge of parallel processing and pipeline processing.

f. **Topics:**

1. Introduction to Computer System Architecture and Digital Computers.

2. Register transfer language. Arithmetic, logic and shift micro operations.

3. Common bus system design and memory transfers. Tri-state buffers.

4. Binary data. Arithmetic operations on signed binary numbers. Overflow detection circuit design.
5. Design of Arithmetic Logic Unit and Control Unit. Hardwired Control Unit, Micropragrammed Control Unit.
6. Microprocessor organization, microprocessor sequencing. Memory cycle, memory read cycle, memory write cycle.
7. Microprocessor instruction set and addressing modes. Types of microprocessor instructions, machine language, introduction to assembly language.
8. Stack operations, Subroutines, Interrupts, Priority Interrupt.
9. Memory system design, memory hierarchy, primary memory (RAM. ROM), secondary memory. Function table of RAM & ROM, memory address map. Interfacing microprocessor with memory.
10. Cache memory. Different designs of cache memory system.
11. Virtual memory system. Address mapping using pages.
12. Input/Output Interface, memory mapped input/output, isolated input/output. Parallel peripheral interface, serial communication interface, dedicated interface components. Direct memory access.
13. Introduction to parallel processing. Pipeline processing.