1/3 MCA First Semester

CA1T2 **COMPUTER ORGANIZATION** **Credits : 4**

Lecture Hours : 4 periods / week Internal assessment : 30 Marks

Semester and Examination: 70 Marks

Course Description:

It begins with an introduction to organizational block diagram of a digital computer. As the course progresses each major block ranging from Processor to I/O will be discussed in their full architectural detail. The course talks primarily about Computer Organization and Architecture issues, Architecture of a typical Processor, Memory Organization, I/O devices and their interface and System Bus organization etc. By the end of the course, students are expected to be able to appreciate the Organization and Architecture issues of a Digital Computer and to have a thorough understanding of design and working of various Organizational Blocks.

Course Objective:

- Understand the composition and structure of a computer.
- Students should be able to solve basic binary math operations using the computer.
- Understand various conventional computational organizations and their strengths and weaknesses
- Understands the design principles and various organizational issues of a Digital Computer.
- Understand Processor Organization, Memory Organization, I/O Organization and System Bus design.
- A few case studies will be covered.
- Students should be able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target computer.
- Students should be able to know the capabilities of the stack, the program counter, and the status register and show how these are used to execute a machine code program.

UNIT I:

Number Systems And Computer Arithmetic - Signed and unsigned numbers, Addition and subtraction, multiplication, division, Floating point representation logical operation, Gray code, BCD codes, Error detecting codes. Boolean algebra, Simplification of Boolean expressions, K-Maps.

UNIT II:

Combinational And Sequential Circuits- decoders, Encoders, Multi plexers, Half and Full adders, Shift registers; Sequential circuits- flip-flops.

UNIT III:

Memory Organization-memory hierarchy, Main memory-RAM, ROM chips, Memory address map, memory contention to CPU; Associative Memory-Hardware logic, match, read and write logic; Cache Memory-Associative mapping, Direct mapping, set associative mapping, hit and miss ratio;

UNIT IV:

Basic CPU Organization-Instruction formats-INTEL-8086 CPU architecture-Addressing modes - generation of physical address- code segment registers, Zero, one, two, and three address instructions.

UNIT V:

Intel 8086 Assembly Language Instructions I -Data transfer instructions input- output instructions, address transfer, Flag transfer, arithmetic, logical, shift, and rotate instructions.

UNIT VI:

Intel 8086 Assembly Language Instructions II - conditional and unconditional transfer, iteration control, interrupts and process control instructions, assembler directives. Programming with assembly language instructions.

UNIT VII:

Micro Programmed Control - Control memory, Address sequencing, Microprogram example, design of control unit Hard

wired control. Microprogrammed control

UNIT VIII:

Input -Output Organization - peripheral devices, input-output interface-I/ 0 Bus and interface modules, I/O versus Memory bus, isolated versus memory mapped I/O, Modes of transfer-Programmed I/O, Interrupt-initiated I/O, priority interrupts-Daisy chaining, parallel priority, interrupt cycle, DMA-DMA control, DMA transfer, Input output processor-CPU-IOP communication.

Learning Resources :

Text Books:

1. Morris Mano -Computer System Architecture –Pearson Education, 3/e, 2007.
2. Microprocessors and Interfacing – Senthil Kumar, Sarvanan, Jevanathan and Shah, Oxford press, 1/e, 2012.

Reference Books:

1. Computer Architecture and Organization – John P. Hayes, McGraw Hill, 3/e, 1998.
2. Computer Systems Organization and Architecture, John D. Carpinelli, PEA, 2009.
3. Computer Organization and Architecture,William Stallings , PEA,8/e, 2010.
4. Douglas V.Hall Intel 8086-Programming- McGraw-Hill International studies.