COMPUTER ORGANIZATION AND ARCHITECTURE

SUB CODE: CE 403 / IT 403

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	00	02	05	04	03	70	30	20	30	150

Learning Objectives

The educational Objectives of this Course are:

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To learn the architecture and assembly language programming of 8085 microprocessor.
- To study peripherals and their interfacing with 8085 microprocessor.

Outline of the Course

Sr. No	Title of the Unit	Minimum Hours
1	**Boolean Algebra and Logic Gates**	06
2	**Simplification of Boolean Function**	06
3	**Sequential Logic**	05
4	**Overview of Transfer and Micro-operations**	05
5	**Basic Computer Organization and Design**	06
6	**Programming the Basic Computer**	05
7	**Central Processing Unit**	06
8	**Pipeline Processing**	06

Total hours (Theory): 45

Total Hours (Lab): 30

Total hours: 75

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Boolean Algebra and Logic Gates** Basic definition, Axiomatic Definition, Basic theorem and Properties of Boolean algebra, Minterms and Maxterms, Logic Operations, Digital logic gates, IC digital logic families	06	15
2	**Simplification of Boolean functions:** Different types map method, product of sum simplification, NAND or NOR implementation, Don't care condition, Tabulation method, Adder, subtractor, Code Conversion, Universal Gate	06	13
3	**Sequential Logic:** Flip-flops, Triggering of Flip-flops, Analysis of clocked sequential circuits, State reduction and Assignment, Flip-flop excitation, Design of counters, Design with state equations	05	12
4	**Overview Of Register Transfer And Microoperations** • Register Transfer Language, Register transfer. • Bus and Memory transfer • Arithmetic Micro-operations. • Logic Micro-operations • Shift Micro-operations, Arithmetic Logic Shift Unit.	05	12
5	**Basic Computer Organization And Design** • Instruction codes, Computer registers • Computer instructions. • Timing and Control, Instruction cycle. • Memory-Reference Instructions • Input-output and interrupt. • Design of Basic computer, Design of Accumulator Unit.	06	12
6	**Programming The Basic Computer** • Introduction, Machine Language,Assembly Language, the Assembler. • Program loops. • Programming Arithmetic and logic operations. • Subroutines. • I-O Programming.	05	12
7	**Central Processing Unit** • Introduction, General Register Organization, Stack Organization • Instruction format. • Addressing Modes • Data transfer and manipulation • Program Control, Reduced Instruction Set Computer (RISC).	06	12
8	**Pipeline Processing** • Parallel Processing	06	12

	• Pipelining • Arithmetic Pipeline • Instruction Pipeline • RISC Pipeline		
	TOTAL	**45**	**100**

Instructional method and Pedagogy

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.

Learning Outcome

- Understanding Logic gates, flip flops and counter
- Clear Understanding of Computer Architecture
- Pipeline processing
- RISC and CISC architectures
- Develop a base for advance micro-processors

Reference Books:

1. Computer System Architecture: By M. Morris Mano.
2. Structured Computer Organization: By Tanenbaum.
3. Computer Organization: By Stallings.
4. Computer Architecture and Organization: By Hayes.
5. Microprocessor Architecture, Programming, and Applications with the 8085 - Ramesh S. Gaonkar Pub: Penram International.

List of Experiments

Sr. No	Name of Experiment
1	To study and perform about logic gates.
2	To study and perform about De'Morgan's Theorem.
3	To study and perform about NAND and NOR as a universal gates.
4	To design and implement circuit that converts binary code to gray code.
5	To study and perform about Half Adder and full Adder.
6	To study and perform about Half substractor and full substractor.
7	To design 3-bit odd/even parity generator and checker.
8	To study and perform about R-S and D flip flop.
9	To study and perform about J-K and T flip flop.
10	To study and perform about Master slave JK flip flop.
11	To realize Boolean functions using multiplexer.
12	To study and perform about Decoder and Demultiplexer.
13	To study the use of decoder for BCD to seven segment LED display.
14	To study universal shift register.