Marwadi University

Syllabus for Bachelor of Technology

Information and Communication Technology

Subject Code: 01CT0301

Subject Name: Computer Organization and Architecture

B. Tech. Year – II (Semester III)

Objective:

To conceptualize the concepts of organizational and architectural issues of a digital computer. Further, analyze performance issues in processor and memory design of a digital computer. Also, understanding various data transfer techniques in digital computer and to analyze processor performance improvement using instruction level parallelism.

Credits Earned: 04 Credits

Course Outcomes: After completion of this course, student will be able to:

1. To apply knowledge of the processor's internal registers and operations by use of a PC based microprocessor simulator.
2. Understand and describe the basics of various architectural units of the Computer System
3. Apply the knowledge of combinational and sequential logical circuits to mimica simple computer architecture
4. List and specify the various features of microprocessor, memory and I/O devices including concepts of system bus.
5. Recognize the importance of parallelism in computer architecture.
6. To eliminate or remove stall by altering order of instructions.
7. To write assembly language programs and download the machine code that will provide solutions real-world control problems.

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Introduction to Computer Architecture** Basic computer data types, Instruction codes, Instruction cycle, Computer registers, computer instructions, Timing and Control, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer	6
2	**Introduction to Computer Organization:** Instruction codes, Computer registers, Computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description.	5
3	**Fundamentals of Micro programmed Control:** Control Memory, Address sequencing, Micro program Example, design of control Unit	4
4	**Concepts of Central Processing Unit:** Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC)	7
5	**Computer Arithmetic** Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic Unit.	7
6	**Introduction to Pipeline:** Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline	4
7	**Input-Output Organization:** Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, DMA, Input-Output Processor (IOP), Priority Interrupt, CPUIOP Communication, Serial Communication.	5
8	**Memory Organization** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.	4
	Total Hours	42

Suggested Text books / Reference books:

1. M. Morris Mano, Computer System Architecture, Pearson
2. Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, Sixth Edition, PHI
3. M. Murdocca & V. Heuring, Computer Architecture & Organization, WILEY
4. John Hayes, Computer Architecture and Organization, McGraw Hill

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Open Ended Projects:

1. Design a program for Digital Clock with format HH:MM:SS (Address and data field) using inbuilt routines of monitor program of your system.
2. Compare the microprocessor and microcontrollers from hardware and software point of view.