No	Information of IT-41023	
1	Unit name:	Computer Architecture and Organization
2	Code:	IT-41023
3	Classification:	Engineering Subject
4	Credit value:	4
5	Semester/ Year Offered:	I/IV
6	Pre-requisite:	Basic HW/SW
7	Mode of delivery:	Lecture, Practical, Tutorial
8	Assessment system and breakdown of marks: Practical Tutorial Mid-term/ Final Examination	20% 10% 70%
9	Academic staff teaching unit:	1
10	Course outcome of unit: In this course, students will be able a. to have the basic skills for computer architecture and organization b. to evaluate quantitatively computer performance by using benchmark suites and skills c. to improve computer performance by using hardware and software techniques d. to design and analyze the main functional units of a computer, a sample instruction set for a theoretical machine and compare between the different computer systems structures according to a certain criterion	
11	Synopsis of unit: The course covers the interfacing of software and hardware with computer installed ModelSim. The course introduces the nature of computing, the element of computer, first, second third generation of computer, structure versus behavior, VHDL description, sequential circuit, register levels component and design, queueing mode, accumulator based CPU, instruction sets coprocessor,	

	fixed-point arithmetic, register file, combinational and sequential ALU, floating - point arithmetic, pipeline processing, hardware control, microprogrammed control, CPU control unit, memory technology. There are examples and exercises at the end of the most chapters to enhance the book's usefulness in the classroom.
12	Topic: • Design Methodology 2.1. System Design • System Representation • Design Process • The Gate Level 2.2. The Register Level • Register Level Components • Programmable Logic Devices • Register Level Design 2.3. The Processor Level • Processor Level Components • Processor Level Design • Processor Basics 3.1. CPU Organization • Fundamentals • Additional Features 3.2. Data Representation • Basic Formats • Fixed Point Numbers • Floating Point Numbers 3.3. Instruction Sets • Instruction Formats • Instruction Types • Programming Considerations • Datapath Design 4.1. Fixed Point Arithmetic

- Addition & Subtraction
- Multiplication
- Division

4.2. Arithmetic Logic Unit

- Combinational ALU
- Sequential ALU

4.3. Advanced Topics

- Floating Point Arithmetic
- Pipeline Processing
- Control Design

5.1. Basic Concepts

- Introduction
- Hardware Control
- Design Examples

5.2. Microprogrammed Control

- Basic Concepts
- Multiplier Control Unit
- CPU Control Unit

5.3. Pipeline Control

- Introduction Pipelines
- Pipeline Performance
- Superscalar Processing

- Memory Organization

6.1. Memory Technology

- Memory Device Characteristics
- Random Access Memories
- Serial Access Memories

6.2. Memory Systems

- Multilevel Memories
- Address Translation
- Memory Allocation

	6.3. Caches • Main Features • Address Mapping • Structure versus Performance
12	Main references: John P. Hayes, Computer Architecture and Organization, Third Edition. McGraw-Hill Series in Computer Science, Computer Organization and Architecture and Computer Engineer
13	Additional references: Nicholas P Carter, Computer Architecture and Organization. 2nd Edition.