ITE2001	Computer Architecture and Organization	L	T	P	J	C
		3	0	0	0	3
Pre-requisite	ITE1001	| **Syllabus version**					
		1.0				

Course Objectives:

- To learn the architecture of computer system.
- To introduce the various design aspects of computer system
- To familiarize with the latest technologies of memory, I/O, ALU design, instruction execution

Expected Course Outcome:

1) Learn the fundamentals of architecture in computer systems.

2) Learn, design and implement the various algorithms of computer arithmetic operations.

3) Describe the various data representation techniques in number systems.

4) Comprehend the various architectures and organization of memory systems.

5) Understand the concepts of virtual memory in memory management.

6) Evaluate the latest technologies of memory, I/O, ALU design and instruction execution

7) Comprehend and understand the concepts of device subsystems in memory management.

Student Learning Outcomes (SLO):	**1, 2, 4**

[1] Having an ability to apply knowledge of mathematics, science, and engineering

[2] Having a clear understanding of the subject related concepts and of contemporary issues

[4] Having Sense-Making Skills of creating unique insights in what is being seen or observed (Higher level thinking skills which cannot be codified)

Module:1	**Fundamentals Of Computer Architecture**	**9 hours**

Organization of the von Neumann machine; Instruction formats; Pipeline - fetch/execute cycle, instruction decoding and execution; Registers and register files; Instruction types and addressing modes; Subroutine call and return mechanisms; Other design issues.

Module:2	**Computer Arithmetic**	**5 hours**

Data Representation, Hardware and software implementation of arithmetic unit for common arithmetic operations: addition, subtraction, multiplication, division(Fixed point and floating point)-floating point IEEE standards

Module:3	**Data Representation**	**5 hours**

Conversion between integer and real numbers- rounding and truncation; The generation of higher order functions from square roots to transcendental functions; Representation of non-numeric data (character codes, graphical data)

Module:4	Memory System Organization And Architecture	4 hours
Memory systems hierarchy; Coding, data compression, and data integrity; Electronic, magnetic and optical technologies; Main memory organization, Types of Main memories, and its characteristics and performance; Latency, cycle time, bandwidth, and interleaving; Cache memories (address mapping, line size, replacement and write-back policies)	
Module:5	Virtual Memory	4 hours
Virtual memory systems-paging, segmentation, address mapping, page tables, page replacement algorithms; Reliability of memory systems; error detecting and error correcting systems	
Module:6	Interfacing And Communication	8 hours
I/O fundamentals: handshaking, buffering; I/O techniques: programmed I/O, interrupt-driven I/O, DMA; Buses: bus protocols, local and geographic arbitration. Interrupt structures: vectored and prioritized, interrupt overhead, interrupts and reentrant code	
Module:7	Device Subsystems	7 hours
External storage systems; organization and structure of disk drives and optical memory; Flash memories, Basic I/O controllers such as a keyboard and a mouse;RAID architectures; I/O Performance; SMART technology and fault detection	
Module:8	Contemporary issues:	3 hours
	Total Lecture hours:	45 hours

Text Book(s)

1. J. L. Hennessy & D.A. Patterson, Computer architecture: A quantitative approach, Fifth Edition, Morgan Kaufman, 2012.

Reference Books

1. W. Stallings, Computer organization and architecture, Seventh Edition, Prentice-Hall, 2013
2. M. M. Mano, Computer System Architecture, Third Edition, Prentice-Hall 2008.
3. J. P. Hayes, Computer architecture and Organization, Third edition, McGraw Hill, 2012.

Recommended by Board of Studies	05-03-2016		
Approved by Academic Council	No. 40	Date	18-03-2016