COURSE CONTENT

ADVANCED COMPUTER ARCHITECTURE								
I Semester: M.TECH – ES								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESD08	**ELECTIVE**	3	-	-	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisite:								

I. COURSE OVERVIEW:

This course intended to provide the structure, internal working and implementation of a computer system. The fundamentals of various functional units of computer, computer instructions, addressing modes, computer arithmetic and logic unit, registers, data transfer, memory and input output system. It focuses on analysis of computer performance and functioning in modern computers.

II. COURSES OBJECTIVES:

The students will try to learn

I. Understand the concept of micro-architectural design of processors.
II. Analyze performance improvement and power savings in current processors.
III. Study the different multiprocessor architectures and related issues.
IV. Improve the knowledge on performance issues of memory and I/O systems.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO 1 Explain the structure, characteristics of computer systems and the various functional units for understanding the components of computers.
CO 2 Demonstrate the computer languages, machine, symbolic and assembly levels for understanding execution of program.
CO 3 Recall the number system their representations and conversion for the usage of instructions in digital computers.
CO 4 Demonstrate the register transfer language, represent memory and Arithmetic/ Logic/ Shift operations for implementation of micro-operations.
CO 5 Illustrate the basics of hardwired and micro-programmed control of the CPU which generates the control signals to fetch and execute instructions
CO 6 Compare different types of addressing modes for specifying the location of an operand.

IV. COURSE CONTENT:

MODULE – I: FUNDAMENTALSOFCOMPUTERDESIGN (08)

Fundamentals of computer design: Defining computer architecture, trends in technology, power in integrated circuits and cost, measuring and reporting performance, quantitative principles of computer design; Instruction set principles: Classifying ISA, design issues.

MODULE –II: INSTRUCTION-LEVELPARALLELISM (09)

ILPconcepts: Pipelining over view, compiler techniques for exposing ILP; Dynamic branch prediction;
Dynamic scheduling; Multiple instructions issue; Hardware based speculation; Static scheduling; Limitations of ILP; Case studies of contemporary microprocessors.

MODULE –III: DATA-LEVELPARALLELISM (09)
ILP software approach: Compiler techniques, static branch protection, VLIW approach, hardware support for more ILP at compile time, hardware verses software solutions.
Multi vector and SIMD computers: Vector processing principles, multi svector multiprocessors, compound vector processing, SIMD computer organizations, the connection machine CM-5; Loop level parallelism.

MODULE –IV: MEMORYANDI/O (09)
Introduction; cache performance: Reducing cache miss penalty and miss rate, Reducing hit time, Main memory and performance, Memory technology; Types of storage devices: Buses, RAID, Reliability,
Availability and depend ability; Virtual memory; I/O performance measures: Designing an I/O system.

MODULE –V: MULTIPROCESSORSANDTHREAD-LEVELPARALLELISM (10)
Introduction; Symmetric shared-memory architectures; Performance of Symmetric shared-memory architectures; Distributed shared memory and directory-based coherence; Basics of synchronization; Models of memory consistency; Multithreading.

V. TEXT BOOKS:

1. John L Hennessey and David A Patterson, ―Computer Architecture A Quantitative Approach‖, Morgan Kaufmann/ Elsevier, 5th Edition, 2013.
2. John L Hennessey and David A Patterson, ―Computer Architecture A Quantitative Approach ‖, Morgan Kaufmann/ Elsevier, 6th Edition, 2017.

VI. REFERENCE BOOKS:

1. Kai Hwang, Faye Briggs, ―Computer Architecture and Parallel Processing‖, McGraw-Hill International Edition, 2000.
2. Sima D, Fountain T. Kacsuk P, ―Advanced Computer Architectures: A Design Spaces Approach‖, Addison Wesley, 2000.
3. David E. Culler, Jaswinder Pal Singh, Anoop Gupta, ―Parallel Computer Architecture, A Hard ware/ Software Approach‖, Elsevier.

VII. WEB RESOURCES:

1. http://uni-site.ir/khuelec/wp-content/uploads/Computer-Architecture-A-Quantitative-Approach.pdf
2. https://doc.lagout.org/Computer%20Architechture.pdf
3. http://lecturesppt.blogspot.in/2010/03/advanced-computer-architecture.html

VIII. E-Text Books:

1. http://www.freebookcentre.net/ComputerScience-Books-Download/Advanced-ComputerArchitecture- (PDF-76P).html
2. http://www.freebookcentre.net/CompuScience/Free-Computer-Architecture-Books-Download.html