



**C-DAC & Gujarat Technological University
M.E. Electronics & Communication Engineering
(VLSI & Embedded Systems Design)
Gandhinagar**

Semester: I

Subject Name: Advanced Computer Architecture

Subject Code: 2715201

UNIT I - Introduction & Performance measurement in computer architecture

Basic concepts of computer organization. The stored program model. Classes of computer architecture. Processor vs. System architecture. Elements of computer systems – processors, memories, I/Os, disks, buses etc. Goals of computer architecture – performance, throughput, latency, power, cost. Processor performance vs. system performance. Comparison of various platforms in terms of performance and efficiency

UNIT II- Processor Architecture

Internal elements and architecture of processors. Instruction execution. Instruction set architectures, CISC vs. RISC architectures. Bus architecture. Multi Processor architecture. Memories and Caches. Cache coherency. Pipelining and data path elements

UNIT III - System and System on Chip architecture

System architecture elements. H/W component selection and datasheet analysis. Bill of Materials. IP selection and System on Chip integration. Standard interfaces and I/Os. Analog and Mixed signal element integration. Reset and clocking elements. Multi processor system

UNIT IV - Special processor/system architectures

Application specific processors. Packet processing. Microcontrollers. Network controllers. DSP and Multimedia processors. GPU elements

UNIT V - Current Architectural survey

An overview of the latest Intel, ARM, TI, SPARC and Power PC architectures as modern SOC architectural elements

Lab:

Tools used during laboratory works: Linux, Perl, Gcc, Gdb.

- Study and implementation of processor performance using opencores.
- Study and implementation of performance of openSPARC and ARM / ARC processors.
- Study and implementation of SOC architectures



Reference:

1. V.C. Hamacher, Z.G. Vranesic, S.G. Zaky. “Computer Organization”. 5th Edition. “Peter”, 2003. 832p.
2. David A. Patterson and John L. Hennessy. Computer Organization and Design, Revised Printing, Third Edition, Third Edition: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer. Series in Computer Architecture and Design). Morgan Kaufmann; 3rd Edition. 2007. 741p.
3. Andrew S. Tanenbaum. Structured Computer Organization Prentice Hall; 5th Edition. 2005. 800p.
4. W. Stallings. “Computer Organization and Architecture. Designing and Performance”. 7th Edition. Prentice Hall. 2005.
5. J.L. Hennessy, D.A. Patterson. “Computer architecture: A Quantitative Approach”, 4th Edition. Morgan Kaufmann, 2006. 704p.
6. UltraSPARC T1™ Supplement to the UltraSPARC Architecture 2005. Sun Microsystems. 2006
7. OpenSPARC™ T2 Core Micro architecture Specification. Sun Microsystems. 2008