LESSON PLAN

Type	Code	COMPUTER ARCHITECTURE	L-T-P	Credits	Marks
CS	CC-10		3-1-0	4	100
Topic Objective		Understand units of measure common to computer systems. Appreciate the evolution of computers. Understand the computer as a layered system. Be able to explain the von Neumann architecture and the function of basic computer components.			
Prerequisites		Knowledge of basic computer science concepts such as data structures, algorithms, and programming languages is essential. This forms the foundation upon which computer architecture is built.			
Lecture Scheme		Regular lectures (classroom /virtual class with Laptop/Desktop/Smartphone) with use of ICT, lectures are planned to be interactive with focus on problem solving activities.			

Evaluation Scheme

Internal Assessment			Written Assessment	Total
Assignment(s)	Unit Test	Mid-Term (Written)	End-Term	
0	0	30	45	100

University Syllabus

Unit No	Topics	Hours
Unit-1	Cache Memory: Computer Memory System, Cache Memory Principles, Elements of Cache Design, Pentium-4 Cache Organization, ARM Cache Organization. Internal Memory: Semiconductor Main Memory, Error Correction, Advanced DRAM Organization	10
Unit-2	External Memory: Magnetic Disk, RAID, Solid State Drivers, Optical Memory, Magnetic Tape. Input/ Output: External Devices, I/O Modules, Programmed I/O, Interrupt Driven I/O, Direct Memory Access, I/O Channels and Processors, The External Interface (Thunderbolt & InfinBand), IBM zEnterprise 196 I/O Structure.	10
Unit-3	Instruction Sets Characteristics & Functions: Machine Instruction Characteristics, Types of Operands, Intel x86 & ARM Data Types, Types of Operations, Inter x86 & ARM Operation Types. Instruction Sets Addressing Modes & Formats: Addressing Modes, x86 & ARM Addressing Modes, Instruction Formats, x86 & ARM Instruction Formats, Assembly Language.	10
Unit-4	Processor Structure & Functions: Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, The x*^ Processor Family, The ARM Processor. Instruction-Level Parallelism & Superscalar Processors: Design Issues, Pentium-4, ARM Cortex-A8.	
Unit-5	Parallel Processing: Multiple Processor Organization, Symmetric Multiprocessors, Cache Coherence & MESI Protocol, Multi-threading & Chip Multiprocessors, Clusters, Non-uniform Memory Access, Vector Computation.	10

	Multicore Computers: Hardware Performance Issues, Software Performance Issues, Multicore Organization, Intel x86 Multicore Organization, ARM11 MPCore, IBM zEnterprise 196 Mainframe.	
	Total (Hours)	40

Text Books:

1. Computer Organization and Architecture by William Stallings
2. "Computer Architecture: A Quantitative Approach" by John L. Hennessy and David A. Patterson

Type	**CC-06**	**LESSON PLAN**	**L-T-P**	**Credits**	**Marks**
Lecture No	Unit No	**COMPUTER ARCHITECTURE**	3-1-0	4	100
Lecture01	1	**Topic:** Cache Memory: Computer Memory System **Ref:** https://www.geeksforgeeks.org/cache-memory-in-computer-organization/			
Lecture 02	1	**Topic:** Cache Memory Principles **Ref:** https://www.geeksforgeeks.org/cache-memory-in-computer-organization/			
Lecture 03	1	**Topic:** Elements of Cache Design, **Ref:** https://www.scribd.com/document/647765918/Elements-of-cache-design			
Lecture04	1	**Topic:** Pentium-4 Cache Organization **Ref:** https://www.owchallie.com/systems/cache-pentium4.php			
Lecture 05	1	**Topic:** ARM Cache Organization **Ref:** https://www.rfwireless-world.com/Tutorials/ARM-tutorial-P6.html			
Lecture 06	1	**Topic:** Internal Memory: **Ref:** https://computerhardwarecomps.weebly.com/internal-memory.html			
Lecture 07	1	**Topic:** Semiconductor Main Memory **Ref:** https://en.wikipedia.org/wiki/Semiconductor_memory			
Lecture 08	1	**Topic:** Error Correction **Ref:** https://en.wikipedia.org/wiki/Error_detection_and_correction			
Lecture 09	1	**Topic:** Advanced DRAM Organization **Ref:** https://abhaycopi.blogspot.com/2014/04/advanced-dram-organization.html			
Lecture 10	1	**Topic:** External Memory: Magnetic Disk **Ref:** https://www.javatpoint.com/external-memory-in-computer-organization			
Lecture 11	2	**Topic:** Magnetic Disk **Ref:** https://www.geeksforgeeks.org/magnetic-disk-memory/			
Lecture 12	2	**Topic:** RAID, Solid State Drivers **Ref:** https://www.enterprisestorageforum.com/hardware/ssd-raid-boosting-ssd-performance-with-raid/			
Lecture 13	2	**Topic:** Optical Memory **Ref:** https://en.wikipedia.org/wiki/Optical_storage			
Lecture 14	2	**Topic:** Magnetic Tape. Input/ Output **Ref:** https://www.sciencedirect.com/topics/computer-science/magnetic-tape			
Lecture 15	2	**Topic:** External Devices, I/O Modules **Ref:**https://www.scribd.com/document/79676715/External-Devices-and-IO-Module			
Lecture 16	2	**Topic:** Programmed I/O **Ref:** https://en.wikipedia.org/wiki/Programmed_input%E2%80%93output			
Lecture 17	2	**Topic:** Interrupt Driven I/O **Ref:** https://www.geeksforgeeks.org/io-interface-interrupt-dma-mode/			

Lecture 18	2	**Topic:** Direct Memory Access, I/O Channels and Processors **Ref:**https://www.geeksforgeeks.org/direct-memory-access-dma-controller-in-computer-architecture/
Lecture 19	2	**Topic:** The External Interface (Thunderbolt & InfinBand), IBM zEnterprise 196 I/O Structure. **Ref:** https://www.redbooks.ibm.com/redbooks/pdfs/sg247833.pdf
Lecture 20	2	**Topic:** Instruction Sets Characteristics & Functions **Ref:** https://voer.edu.vn/c/instruction-set-characteristics-and-functions/c5bb8246/13d05951
Lecture 21	3	**Topic:** Machine Instruction Characteristics **Ref:** https://www.geeksforgeeks.org/types-of-machine-instructions/
Lecture 22	3	**Topic:** Types of Operands, Intel x86 & ARM Data Types, **Ref:** https://www.scribd.com/presentation/513145366/weeeeeeeeeeeeeee-160314135953-convertido
Lecture 23	3	**Topic:** Types of Operations, Inter x86 & ARM Operation Types **Ref**: https://www.redhat.com/en/topics/linux/ARM-vs-x86
Lecture 24	3	**Topic:** Instruction Sets Addressing Modes & Formats **Ref:** https://witscad.com/course/computer-architecture/chapter/isa-addressing-modes
Lecture 25	3	**Topic:** Addressing Modes, x86 & ARM Addressing Modes **Ref:** https://roboticelectronics.in/addressing-modes-in-arm/
Lecture 26	3	**Topic:** Instruction Formats, x86 & ARM Instruction Formats, Assembly Language. **Ref:** https://www.androidauthority.com/arm-vs-x86-key-differences-explained-568718/
Lecture 27	3	**Topic:** Processor Structure & Functions: Processor Organization **Ref:**https://en.wikibooks.org/wiki/A-level_Computing/OCR/Unit_1.1.1_Structure_and_Function_of_the_Processor
Lecture 28	3	**Topic:** Register Organization, Instruction Cycle **Ref:** https://en.wikipedia.org/wiki/Instruction_register
Lecture 29	3	**Topic:** Instruction Cycle, Instruction Pipelining, **Ref:** https://simple.wikipedia.org/wiki/Instruction_pipelining
Lecture 30	3	**Topic:** The x*^ Processor Family, The ARM Processor. **Ref:** https://en.wikipedia.org/wiki/List_of_ARM_processors
Lecture 31	4	**Topic:** The ARM Processor. Instruction-Level Parallelism **Ref:** https://www.prepbytes.com/blog/computer-architecture/instruction-level-parallelismilp/
Lecture 32	4	**Topic:** The x*^ Processor Family, The ARM Processor **Ref:**https://www.prepbytes.com/blog/computer-architecture/instruction-level-parallelismilp/
Lecture 33	4	**Topic:** Parallel Processing: Multiple Processor Organization **Ref:** https://www.javatpoint.com/parallel-processing
Lecture 34	4	**Topic:** Parallel Processing: Multiple Processor Organization **Ref:** https://www.javatpoint.com/parallel-processing
Lecture 35	4	**Topic:** Software Performance Issues **Ref:**https://www.castsoftware.com/glossary/software-performance-application-engineering-tuning-monitoring
Lecture 36	4	**Topic:** Software Performance Issues **Ref:**https://www.castsoftware.com/glossary/software-performance-

		application-engineering-tuning-monitoring
Lecture 37	4	**Topic:** Multicore Organization **Ref:**https://www.sciencedirect.com/topics/computer-science/multicore-system
Lecture 38	4	**Topic:** Intel x86 Multicore Organization **Ref:** https://en.wikipedia.org/wiki/Multi-core_processor
Lecture 39	4	**Topic:** ARM11 MPCore **Ref:** https://cecs.uci.edu/~papers/aspdac07/pdf/p747_7D-2.pdf
Lecture 40	4	**Topic:** IBM zEnterprise 196 Mainframe. **Ref:** https://www.redbooks.ibm.com/redbooks/pdfs/sg247832.pdf