**Course Title: Computer Organization & Architecture**

**Course No: CSE-209 Credit: 3 Credit Hours: 3 Total Marks: 100**

**Lecture wise Learning Outcome:**

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| **Learning Outcomes** | **Course Contents** | **Teaching Strategy** | **Assessment Strategy** |
| * Define performance * Classify quantitative principles * Compare fallacies and pitfalls * Explain historical perspectives. * Draw computer designs | **1.** Fundamentals of Computer Design and Functions. | * Lecture * Rapport building * Demonstration * Group work | * Q/A * Test (SQ) * Demonstration |
| * Define Processor * Identify Introductions * Differentiate Processor organization * Compare Introduction & information representation * Explain number formats. * Draw organization figure | **2.** Introduction to Processor organization, information representation, number formats. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (BQ) * Demonstration * Assignment |
| * Identify Instruction Sets * Differentiate instruction types * Compare Instruction formats * Explain Instruction formats | **3.** Instruction formats, instruction types. | * Lecture, * Rapport building * Group work * Cooperative learning * Demonstration | * Q/A * Test (S|B) * Demonstration * Assignment |
| * Define Fixed point arithmetic * Identify Addition, subtraction, multiplication, division * Differentiate Addition, subtraction, multiplication, division * Compare Addition, subtraction, multiplication, division * Explain Fixed point arithmetic | **4.** Fixed point arithmetic for Addition, subtraction, multiplication, division. | * Lecture * Rapport building * Demonstration | * Q/A * Test (S|B) * Demonstration * Project |
| * Define ALU Design * Identify Basic ALU * Differentiate floating point arithmetic, arithmetic & arithmetic processors * Compare stack computers & arithmetic processors * Explain Basic ALU organization * Draw ALU | **5.** Basic ALU design and organization | * Lecture * Rapport Building * Demonstration * Group work | * Q/A * Test (S|B) * Demonstration |
| * Define Control Design * Identify Introductions * Differentiate between instruction sequence & instruction interpretation. * Compare instruction sequence, instruction interpretation. * Explain Control Design * Draw Control organization | **6.** Design instruction sequence, instruction interpretation. | * Lecture * Rapport building * Demonstration * Group work | * Q/A * Test (S|B) * Demonstration * Assignment |
| * Define Hardwired Control * Identify Design methods * Differentiate between multiplier control unit, CPU control unit * Compare between multiplier control unit, CPU control unit * Explain Hardwired Control * Draw Design methods | **7.** Hardwired Control and Design methods, multiplier control unit, CPU control unit. | * Lecture * Rapport building * Project work * Demonstration | * Q/A * Test (S|B) * Demonstration * Project |
| * Define Micro Programmed Control. * Identify Basic concepts of Micro Programmed Control * Differentiate control memory optimizations * Compare Conventional and Nano programmed computers. * Explain control memory optimization * Draw control memory optimization | **8.** Micro Programmed Control Basic concepts, control memory optimization, multiplier control unit, Microprogrammed Computers: Conventional and Nano programmed computers. | * Lecture * Rapport building * Project work * Demonstration | * Q/A * Test (S|B) * Demonstration * Project |
| * Define Memory Organization * Identify Review of primary and secondary memories * Differentiate Review of primary and secondary memories * Compare * Explain memory hierarchies * Draw memory hierarchies | **9.** Memory Organization of primary and secondary memories; memory hierarchies. | * Lecture * Group work * Demonstration * Group work | * Q/A * Demonstration |
| * Define High-speed Memories * Identify Interleaved memories * Differentiate caches, associative memories * Compare caches, associative memories * Explain High-speed Memories * Draw High-speed Memories figure | **10.** Interleaved memories, caches, associative memories. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (S|B) * Demonstration |
| * Define System Organization * Identify system Communications * Differentiate Communications, Introduction, bus control * Compare Communications, bus control * Explain Communications, Introduction, bus control * Draw bus control | **11.**SystemCommunications and controls. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (S|B) * Demonstration |
| * Define IO Systems * Identify Programmed IO * Differentiate DMA and interrupts * Compare DMA and interrupts * Explain IO processors. * Draw DMA operation | **12.** Programmed IO, DMA and interrupts, IO processors. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (S|B) * Demonstration |
| * Define Parallel Processing * Identify types of parallel processors * Differentiate performance consideration * Compare performance consideration * Explain RISCs * Draw Parallel Processing | **13.** Introduction and types of parallel processors, performance consideration. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (S|B) * Demonstration |
| * Define Pipeline Processors * Identify Pipeline structures * Differentiate Pipeline structures, vector supercomputers * Compare Pipeline structures, vector supercomputers * Explain Pipeline Processors and Systolic Arrays * Draw data flow computers | **14.** Pipeline Processors **and** structures. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (S|B) * Demonstration |
| * Define M**ultiprocessors** * Identify Multiprocessor architectures * Differentiate fault-tolerant computers. * Compare fault-tolerant * Explain fault-tolerant computers. * Draw Multiprocessor architectures | 15. Multiprocessor architectures, fault-tolerant computers. | * Lecture * Rapport building * Group work * Demonstration | * Q/A * Test (S|B) * Demonstration |

**References:**

1. Null, Linda, and Julia Lobur. “Essentials of Computer Organization and Architecture”, Jones & Bartlett, 7th Edition, December 17, 2017.
2. Stojcev, M. “Computer Organization and Architecture - William Stallings”, Prentice Hall, 10th Edition, April 13, 2019.
3. David A. Patterson, John L. “Computer Organization and Design, the Hardware Software Interfacing - Hennessey”, Morgan Kaufmann: 10th Edition, November 10, 2018.
4. Hossler, F. E., Douglas, J. E. “Computer Architecture and Organization Douglas John Hayes”, Glencoe McGraw-Hill, 8th Edition, September 3, 2018.
5. Carter N. “Scam’s Outline of Computer Architecture”, Glencoe McGraw-Hill, 3rd Edition, December 26, 2011.