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| 1 | Course Code | **CSE209** |
| 2 | Course Title | **Computer Organization and Architecture** |
| 3 | Credits | **4** |
| 4 | Contact Hours | **3-1-0** |
| 5 | Course Objective | To study Organization of a digital computer and design techniques for designing various components of a digital computer |
| 6 | Course Outcomes | After Successful completion of this course a student will be able to:   1. Compare and evaluate computer designs 2. Write simple micro-operations in RTL 3. Design buses 4. Design simple arithmetic circuits 5. Identify various registers and their uses 6. Write programs in simple assembly language 7. Operate **manosim**Simulator and **virtual lab** tool 8. Compare various design techniques for control unit 9. Construct and evaluate a memory system using RAM/ROM chips 10. Evaluate the performance of various memory/cache designing strategies 11. Compare various I/O techniques 12. Evaluate performance of a pipeline 13. Handle various hazards in a pipeline 14. Classify computers in various categories |
| **7** | **Prerequisite** |  |
| **8** | **Course Contents** | |
| 8.01 | Unit A | **Introduction to Computer Organization** |
| 8.02 | Unit A Topic 1 | History, Computer Organization vs. Computer Architecture, Bus: Types, Buses using multiplexers and tri-state buffers, Bus and memory transfer. |
| 8.03 | Unit A Topic 2 | Register transfer language, Micro-operations: Arithmetic ,shift and logic micro operations |
| 8.04 | Unit A Topic 3 | Adder-Subtractor- Incrementor, Arithmetic unit, Logic unit. |
| 8.05 | Unit B | **Computer Arithmetic** |
| 8.06 | Unit B Topic 1 | Representation of numbers in 1’s and 2’s complement, Addition and subtraction of signednumbers. |
| 8.07 | Unit B Topic 2 | Binary Multiplier ,Multiplication: Signed operandmultiplication, Booth algorithm |
| 8.08 | Unit B Topic 3 | Floating point representation: addition and subtraction. |
| 8.09 | Unit C | **Control Unit** |
| 8.10 | Unit C Topic 1 | Hardwire and micro programmed control unit, |
| 8.11 | Unit C Topic 2 | Micro-programming Instruction Format. |
| 8.12 | Unit C Topic 3 | Micro-programming Sequencer, Horizontal and vertical Micro-Programming. |
| 8.13 | Unit D | **Processor Organization** |
| 8.14 | Unit D Topic 1 | Instruction cycle andsub cycles (fetch and executeetc), interrupt: Types and cycle. |
| 8.15 | Unit D Topic 2 | General register organization,stackorganization |
| 8.16 | Unit D Topic 3 | Addressing modes,Instructiontypes, formats, RISC/CISC |
| 8.17 | Unit E | **Memory and I/O** |
| 8.18 | Unit E Topic 1 | RAM/ROM/Flash memory, designing memory system using RAM and ROM chips |
| 8.19 | Unit E Topic 2 | Cache memory: Memory hierarchy, performance Considerations, mapping techniques |
| 8.20 | Unit E Topic 3 | Input Output: Isolated I/O vs. memory mapped I/O, Programmed I/O, Interrupt driven I/O, DMA |
| 10 | **Reading Content** | |
| 10.1 | Text book\* | 1. “Computer system architecture”, Morris M. Mano, Prentice-Hall |
| 10.2 | other references | 1. “Computer Organization”, V. C. Hamacher et al., Mcgrew Hill 2. “Computer Organization and Architecture designing for performance” William Stallings, Pearson 3. Internet as a resource for reference |