**UE18CS256 – Microprocessor & Computer Architecture Lab**

**# of Credits: 1 # of Weeks: 13**

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| Laboratory Title | Microprocessor & Computer Architecture Laboratory (UE18CS256) |
| For the Class | B. Tech. 4th Semester 2018-2022 batch |
| Preamble | Microprocessor & Computer Architecture Laboratory is a core course and complements the theory course in Microprocessor & Computer Architecture. In the theory course, the students study ARM and MIPS architecture and Instruction set. In the lab course, the students implement assembly language programs and sensor based project using Arduino microcontroller. |
| Objective | 1. Implement assembly language programs and develop strong competencies in contemporary ISAs. 2. Develop, edit, compile and debug assembly language programs using present - day simulators. 3. Know various addressing modes that are defined in a given instruction set architecture and illustrate how machine language instructions in that architecture identify the operand(s) of each instruction. 4. Practice interfacing experiments using various sensors with Arduino board. 5. Learner to imbibe the skills of formulation of a complex problem, design a suitable solution using Arduino/ Raspberry Pi processors and demonstrate the end results. |
| Outcome | At the end of the course, the student will be able to:   1. Inculcate the importance of instruction set architecture and their fundamental concepts using assembly language programming. 2. Demonstrate editing, compiling, executing and debugging an assembly language program of a contemporary microprocessor. 3. Demonstrate the usage of subroutines and recursion supported by the ISA. 4. Imbibe strong assembly language programming skills by implementing solutions to problems using simulators. 5. Instilling the idea to formulate a complex problem definition, approach to solve the problem, methodology to apply and implement suitable algorithm and check for the final results. |

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| **Session** | **Tasks** |
| 1 | Introduction to Instruction Set – ARM Processor. Sample programs using Simulator. |
| 2 | Programs on ARM/ x86 using Simulator. |
| 3 | Programs on ARM/ x86 using Simulator. |
| 4 | Demonstration of Arduino Microcontroller with various sensors, Project Discussion. |
| 5 | Project Discussion (Playing Previous year Video) for Half an Hour. Project Title confirmation. |
| 6 | Programs on ARM/ x86 using Simulator. |
| 7 | Introduction to 3 stage Pipeline using simulator and Pluggins. |
| 8 | Introduction to 5 stage Pipeline (case study: Hazards using Simulator - RAW, WAR, WAW). |
| 9 | Cache Memory Demonstration. |
| 10 | Mini Project |
| 11 | Mini Project |
| 12 | Mini Project |
| 13 | Project Evaluation |