*LAB # 14*

*lab task*

***Title:*** *Advanced MIPS Assembly Programming with Control Structures and Bitwise Operations*

***1. Objective***

*To explore advanced concepts in MIPS assembly language, focusing on implementing nested control structures and bitwise operations. This lab will demonstrate how MIPS assembly translates and processes conditional statements with complex conditions and performs bitwise manipulations on integers.*

***2. Hardware/Software Required***

* *Hardware:*
  + *A computer system with at least 4 GB RAM.*
* *Software:*
  + *MARS (MIPS Assembler and Runtime Simulator)*
  + *Text Editor (Notepad++ or Visual Studio Code)*

***3. Methodology***

1. *Problem Statement:  
   Write a program in MIPS assembly language to take three integers as input. Perform the following tasks:*
   * *Check if the first integer is odd or even.*
   * *Compare the second and third integers and identify the larger number.*
   * *Perform a bitwise XOR operation on the two largest numbers.*
2. *Algorithm:*
   * *Take three integers as input from the user.*
   * *Check if the first integer is odd or even using the modulus operation.*
   * *Compare the second and third integers using branch instructions.*
   * *Identify the larger number.*
   * *Perform bitwise XOR between the first integer and the larger of the two numbers.*
   * *Display all results.*
3. *Implementation Steps:*
   * *Define necessary variables in the data segment for input prompts and messages.*
   * *Write the logic in the text segment using appropriate MIPS instructions (e.g., bne, beq, xor, etc.).*
   * *Use branch and jump instructions for control flow.*
   * *Include syscall instructions for input/output.*

***4. Observations***

*Document the following during program execution:*

* *How the program handles odd/even detection.*
* *Execution results when numbers are positive, negative, or zero.*
* *Output correctness for all test cases.*

***5. Results and Discussions***

* *Results: Summarize program outputs for different input sets.*
* *Discussion: Analyze the program's logic, efficiency, and possible improvements. Discuss how MIPS assembly handles bitwise operations and conditional branches.*

***6. Conclusion***

*Summarize the learning outcomes of the lab. Highlight key takeaways, such as the use of bitwise instructions and nested control structures in MIPS assembly programming.*